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Instruction Manual

Agent

Software Program

(Doc Rev I, 2/26/2021)

Warranty Statement

GEOKON warrants its products to be free of defects in materials and workmanship, under normal use and service for a period of 13 months from date of purchase. If the unit should malfunction, it must be returned to the factory for evaluation, freight prepaid. Upon examination by GEOKON, if the unit is found to be defective, it will be repaired or replaced at no charge. However, the WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion or current, heat, moisture or vibration, improper specification, misapplication, misuse or other operating conditions outside of GEOKON's control. Components which wear or which are damaged by misuse are not warranted. This includes fuses and batteries.

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1. SOFTWARE INSTALLATION

1.1 Minimum System Requirements

Before installing Agent Software onto a computer, verify that it meets these minimum system requirements:

- Microsoft Windows® 7, 8, or 10, running a 32 or 64-bit operating system
- 1 GB of free RAM (physical memory) available during runtime

1.2 Download and Installation

To install Agent software, complete the following:

1) Navigate to http://www.GEOKON.com/Software

2) Select the appropriate Agent installer based on the operating system of the computer:
   For 32-bit systems, download "Agent Software (x86)"
   For 64-bit systems, download "Agent Software (x64)"

To determine the computer's operating system: Click /Start, then type "system" in the start search box. Click on "System" in the list under "Control Panel". In the window that opens locate the "System Type:". (Alternatively, use a web browser to navigate to the following address: https://support.microsoft.com/en-us/kb/827218 and follow the instructions given.)

3) Locate and open the Agent-x64.zip (or Agent-x86.zip) folder that was downloaded from the GEOKON website.

4) Double click on the windows installer icon: 

5) If a security warning appears, click "Run".

6) Read the License Agreement in its entirety. Check the box below the agreement to accept the terms of the agreement. (This box must be checked to continue with the installation.)

7) Click "Install".

8) When the installation is complete, click "Finish" to close the installer and launch the program

2. PROGRAM OVERVIEW

Projects are at the top of the program's hierarchy. Each Projects can contain multiple GeoNet Networks and LC2 dataloggers. Each GeoNet Network contains one Supervisor and one or more Nodes.

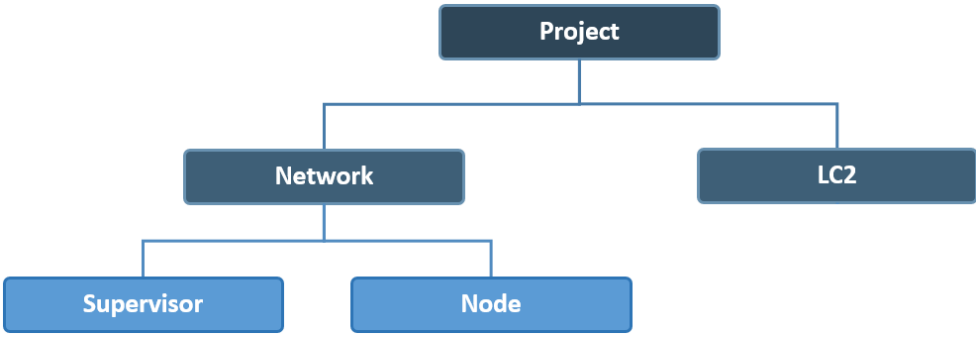

Figure 1 - Program Hierarchy

Supervisors, Nodes, and LC2 Dataloggers can be assigned sensors (which import data collected by the device) and charts (which display data imported by sensors).

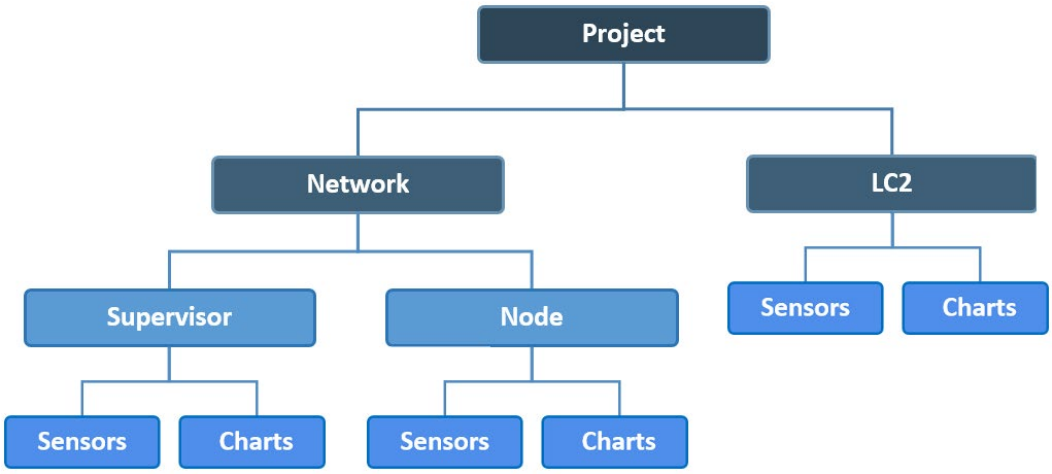

Figure 2 - Program Hierarchy with Sensors and Charts

The menu on the left side of the screen (Figure 3) is used to navigate the program and will expand and contract as the user navigates through the different levels of the program's hierarchy.

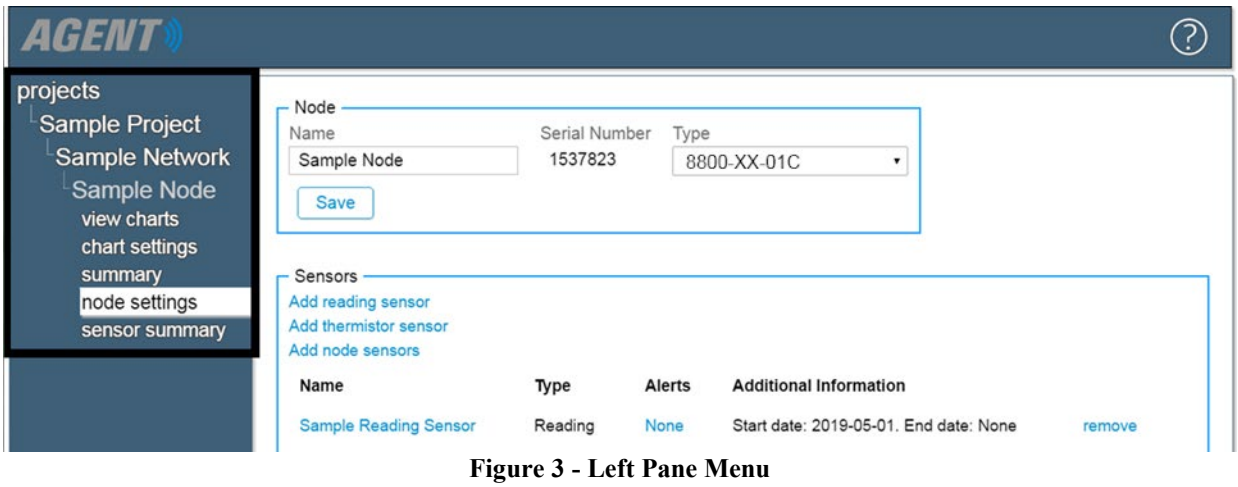

Figure 3 - Left Pane Menu

3. PROJECTS

3.1 Adding a Project

Projects allow the user to sort GeoNet Networks and LC2 dataloggers into groups by saving them under different Projects. On startup, Agent defaults to a screen that lists all the Projects that have been created (Figure 4).

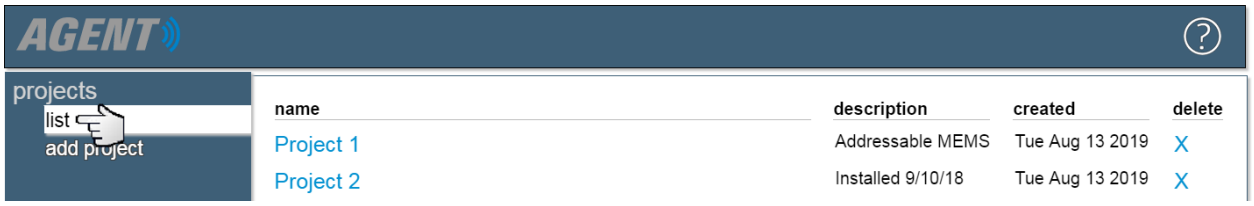

Figure 4 - Project List

To create a new Project, click add project on the left side of the screen. This will open the Add Project screen (Figure 5). Give the Project a name and add a description if desired. Click Save when finished.

Figure 5 - Add Project

When a new Project is created, Agent will return to the Project list.

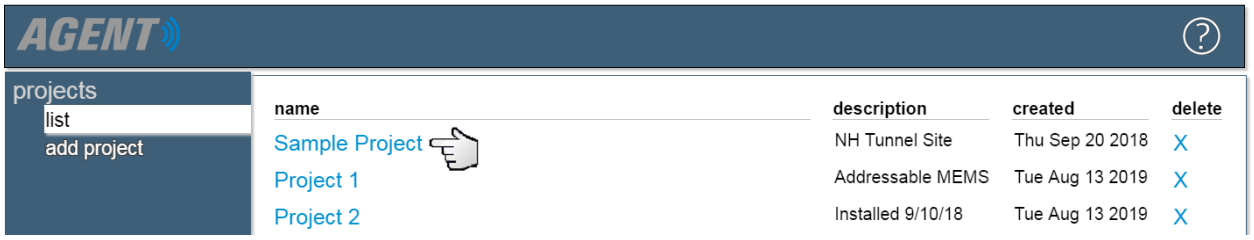

Figure 6 - Projects List Screen

The Project list can be accessed by clicking list on the left side of the screen (Figure 6). (When not in the Projects portion of the program, clicking projects on the left side of the screen will open the Projects list.)

To delete a Project, click on the corresponding X in the delete column. Deleting a Project removes all the information associated with it, **use with caution**.

3.2 Project Menu

Open a Project by clicking on the Project name (Figure 7).

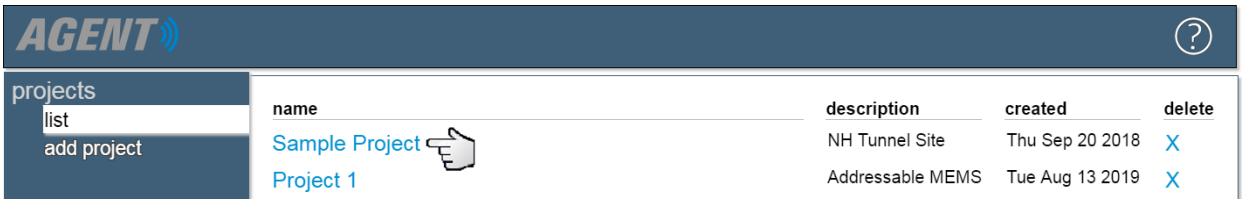

Figure 7 - Select a Project

Agent will navigate to the "list" screen. The Project menu (Figure 8) will be displayed on the left side of the screen.

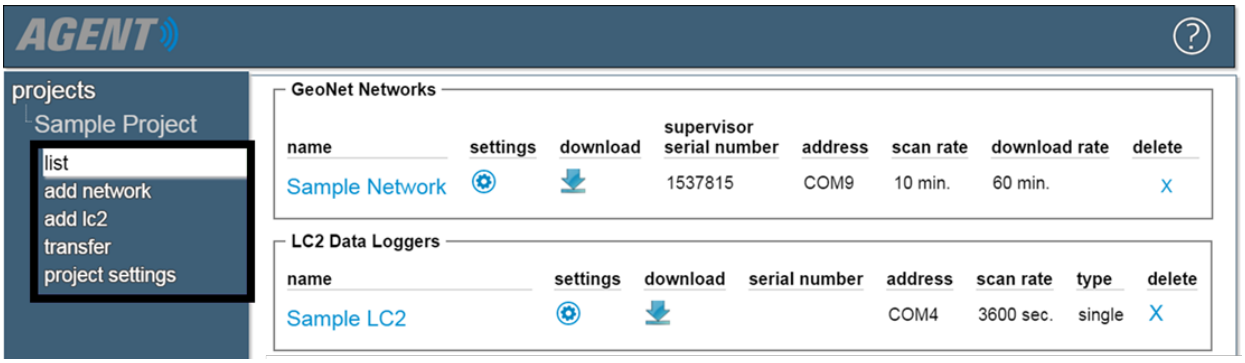

Figure 8 - Project Menu (Left Side of the Screen)

The Project menu is covered by the following sections:
List: The list screen shows all the GeoNet Networks and LC2 dataloggers associated with the Project. See Section 4.3 for the GeoNet Networks portion of the screen and Section 5.2 for LC2 dataloggers portion.
Add Network: Adds a GeoNet Network to the current project. See Section 4.1.
Add LC2: Adds an LC2 datalogger to the current project. See Section 5.1
Transfer: Use to transfer data from one Agent database to another. See Section 8.
Project Settings: Used to edit the project name and description, as well as to access the advanced settings of Agent. See Section 3.3

3.3 Project Settings

3.3.1 General Settings

To edit Project settings, click list on the left side of the screen. (When not in the Projects portion of the program, click projects on the left side of the screen.) Next click on the name of the Project to be edited (Figure 9).

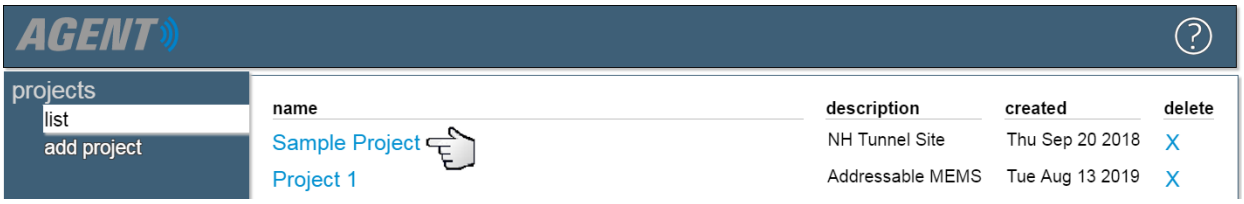

Figure 9 - Select a Project

Next, click project settings on the left side of the screen (Figure 10).

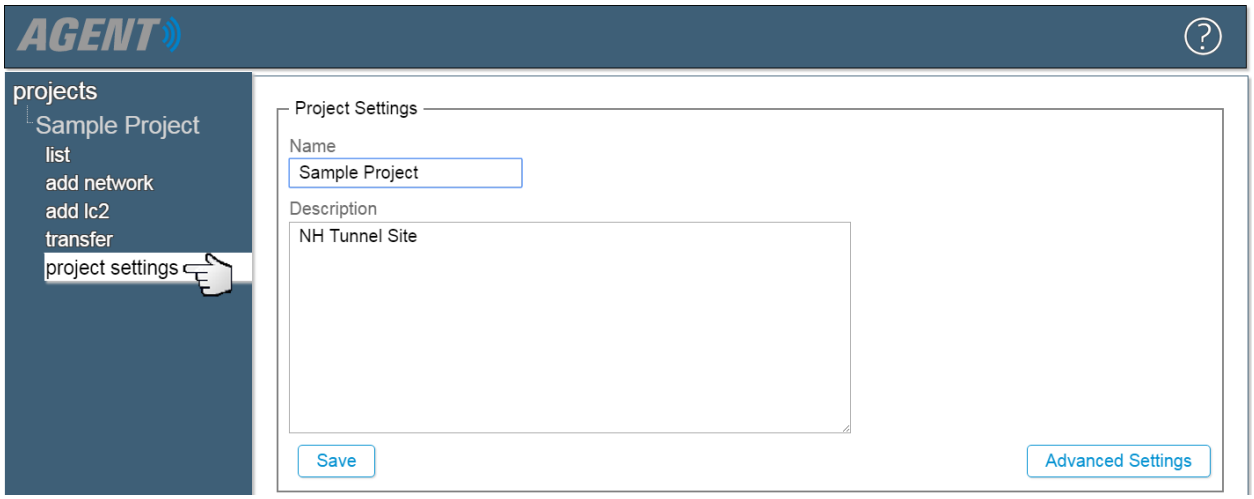

Figure 10 - Project Settings Screen

Edit the Project name and description as desired and then click Save.

3.3.2 Advanced Settings

The Advanced Settings button in the Project settings screen allows the user to edit the internal settings of the Agent program. Advanced settings affect the entire program; they cannot be set for individual Networks or dataloggers.

Access to the settings is password protected. Click Advanced Settings to open the password dialog (Figure 11).

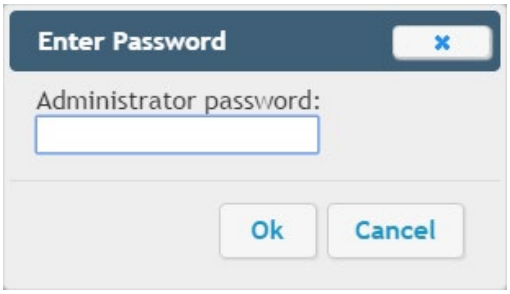

Figure 11 - Password Dialog

The Administrator password is the current date in six-digit format, i.e., day, month, last two digits of the year. For example, if the current date is the third of August 2017, then the Administrator password would be: 030817

Once the correct password has been entered, the Advanced Settings dialog (Figure 12) will open.

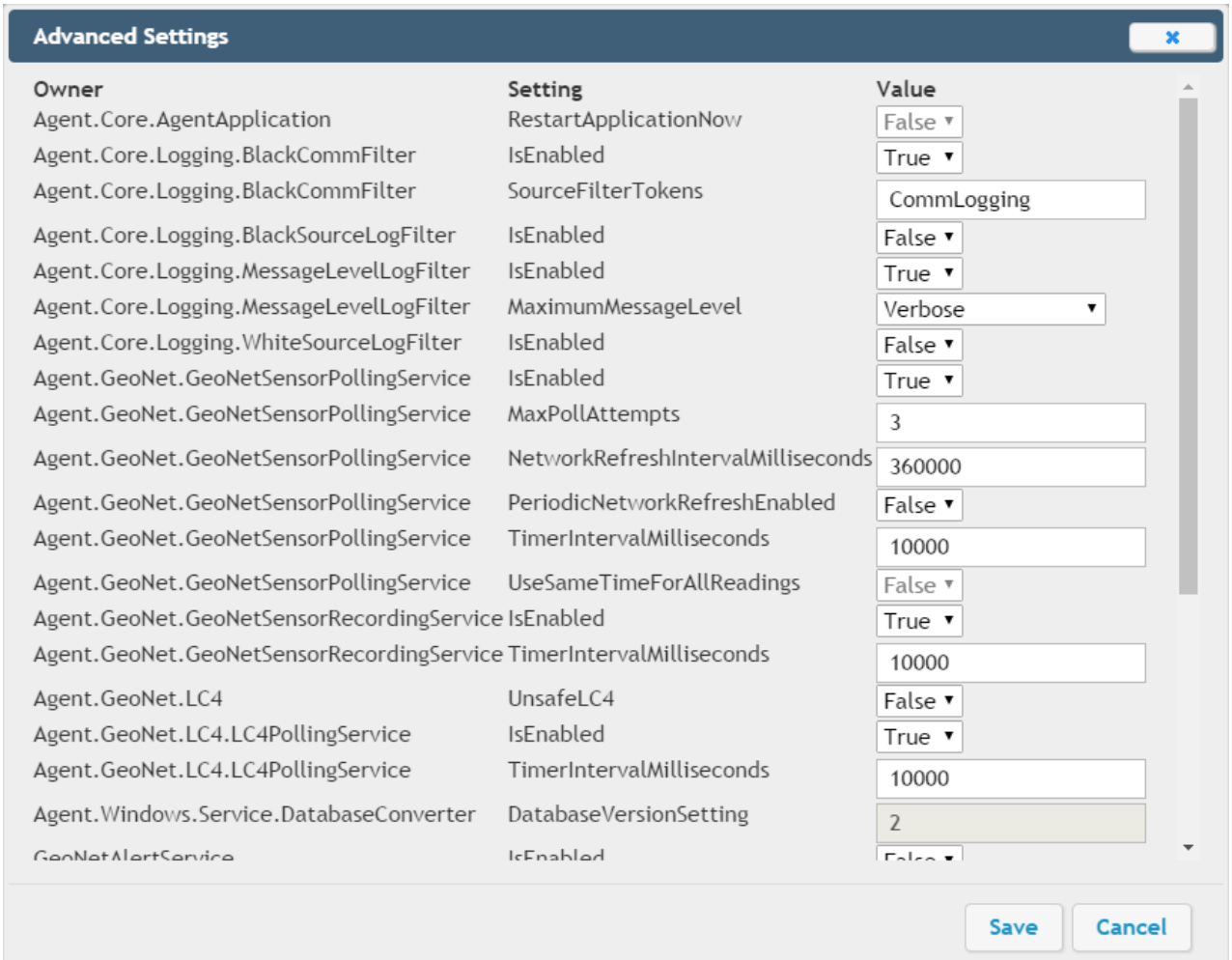

Figure 12 - Advanced Settings

The "**Owner**" column describes the part of the Agent program affected. The "**Setting**" column shows the settings that is being changed. The "**Value"** column displays the current setting. Values can be numbers, text, or in some cases are selected from a drop-down box. (Note: Some settings cannot be changed.)

Save Saves changes to the database. No changes will take effect until the save button is pressed.

Cancel Closes the dialog and returns the settings to their previously saved configuration.

For more information on advanced settings, contact GEOKON.

4. GEONET NETWORKS

It is assumed that all relevant GeoNet hardware has already been installed, and that communication has been established between the Nodes and the Network Supervisor. For information regarding the installation of GeoNet Nodes and Supervisors, please consult the GeoNet instruction manual. (Relevant instruction manuals can be accessed inside the Agent program by clicking the ? icon in the top right corner of the screen.)

Agent communicates with the Network via the Network Supervisor. There are two options for linking a GeoNet Supervisor to a computer: A direct cable connection using a USB or RS-232 cable, or, through a Networked device such as a serial server or cellular modem. For ease of use, the connection should be established prior to opening Agent Software.

4.1 Adding a Network

To add a GeoNet Network, select a Project to add the Network to (Figure 13).

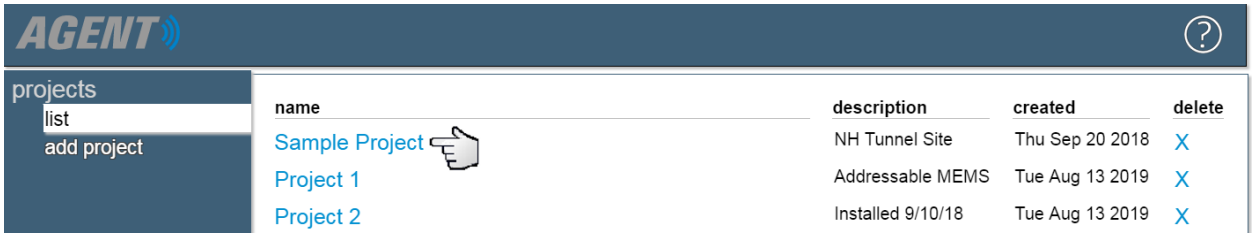

Figure 13 - Select a Project

Next click add network on the left side of the screen to bring up the Network Settings Screen (Figure 14).

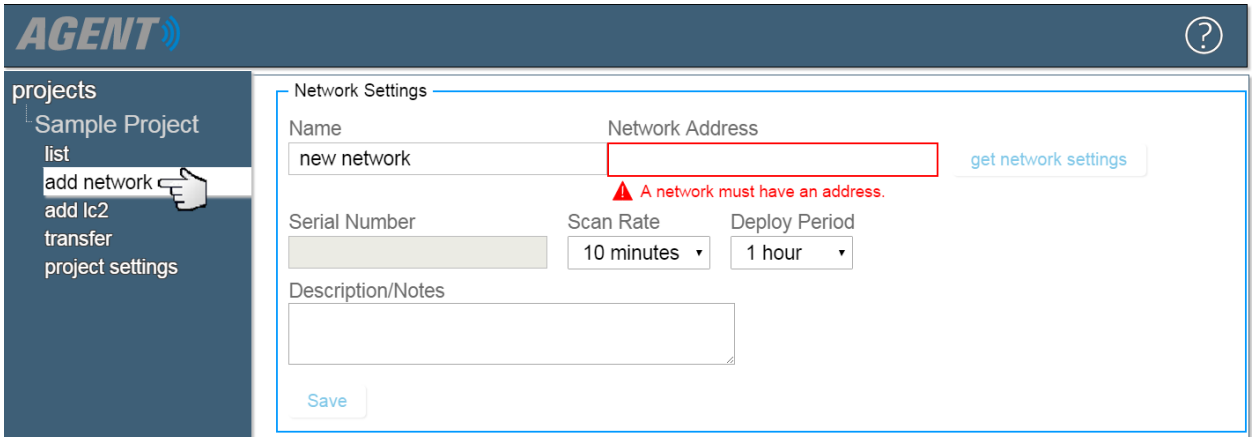

Figure 14 - Network Settings Screen

For Supervisors that have been connected to the PC using a USB or RS-232 cable, continue to Section 4.1.1. For Cellular Gateway Supervisors, see Section 4.1.2. For Supervisor connected through an exterior (add on) network device such as a serial server or cellular modem, see Section 4.1.3.

4.1.1 Connections Using a USB or RS232 Cable

Type “COM” into the “Network Address” field to display a list of available COM ports. Choose the correct port from the list (Figure 15) or type in the full name of the desired COM port.

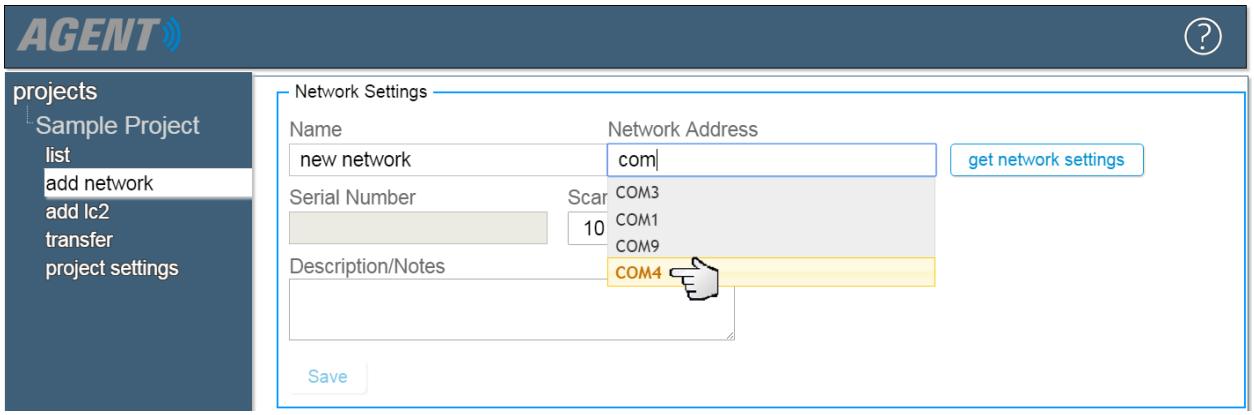

Figure 15 - Enter a COM port

If the correct COM port does not display in Agent, close the program, make sure the device is powered on and the cable connection is secure, and then try again. If unsure of which COM port the Supervisor is utilizing, refer to the information in Appendix A.

Once the Network address had been entered, continue to Section 4.2.

PLEASE NOTE: When changing the connection type for a Cellular Gateway Supervisor from a wireless “Cloud Network” connection to a direct cable connection it is necessary to stop and restart the Agent service for the change to take effect (Figure 16).

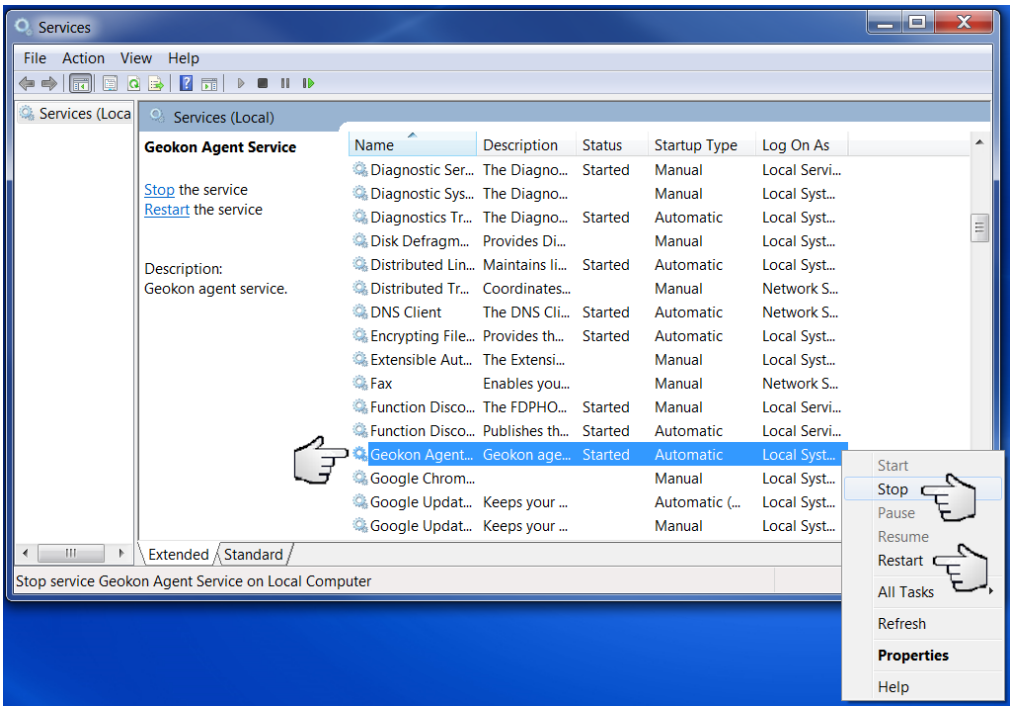

Figure 16 - Stop and Restart the Agent Service

4.1.2 Connecting to a Cellular Gateway Supervisor

The Supervisor must already be commissioned using the api.geokon.com website as described in the GeoNet instruction manual.

Type “token:” into the “Network Address” field. Copy and paste the token created on the commissioning website as the Network Address (Figure 17). Once the Network address had been entered, continue to Section 4.2.

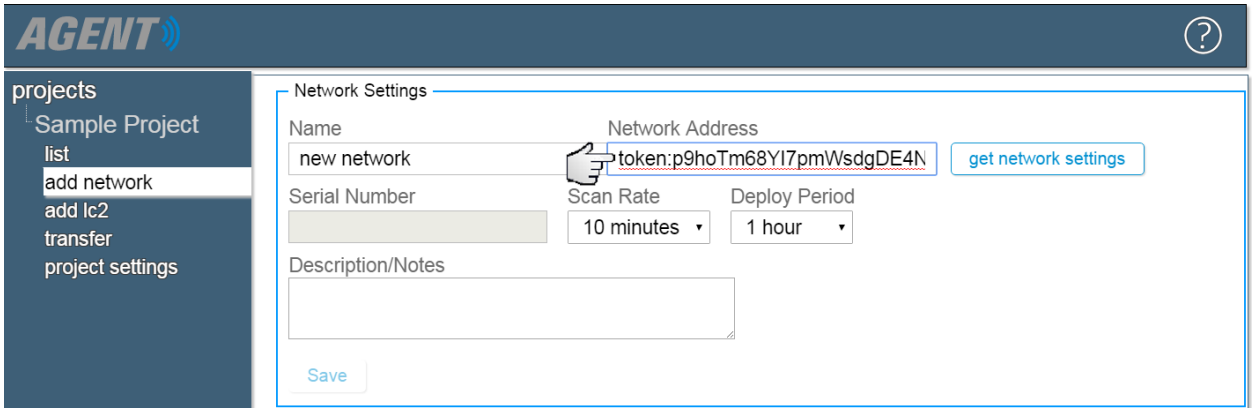

Figure 17 - Enter a Token

PLEASE NOTE: When changing the connection type for a Cellular Gateway Supervisor from a direct cable connection to a wireless “Cloud Network” connection it is necessary to stop and restart the Agent service for the change to take effect (Figure 18).

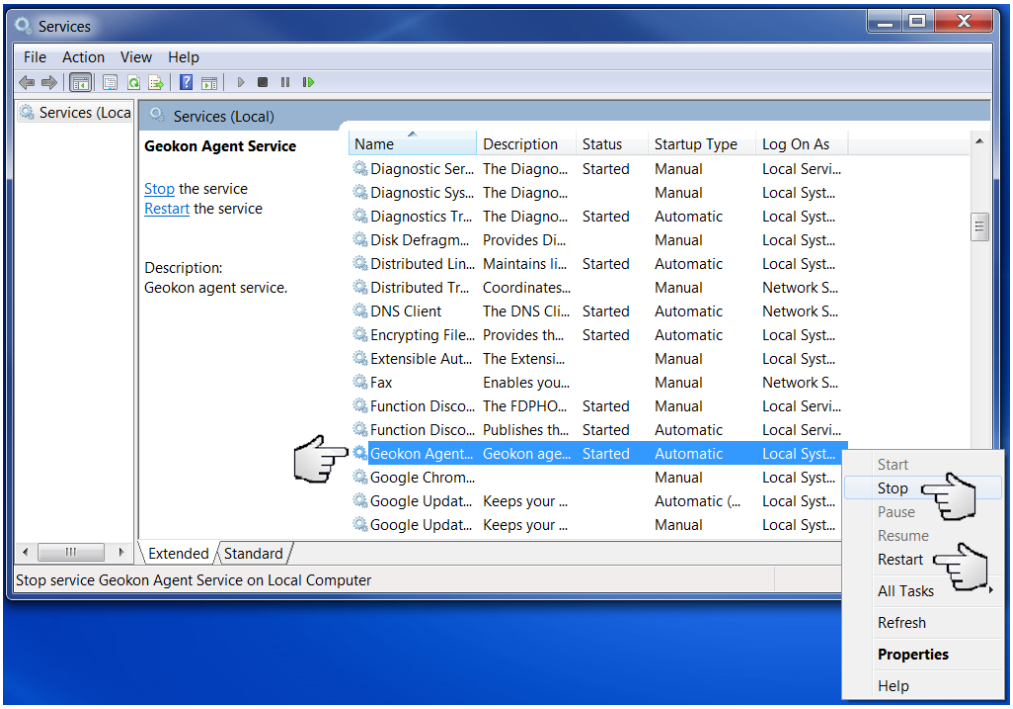

Figure 18 - Stop and Restart the Agent Service

4.1.3 Wireless Connections via an Exterior (add on) Networked Device

Enter the device URL or IP address into the "Network Address" field (Figure 19). An IP address must contain a colon after the address, followed by the port, e.g., 192.168.1.1:5555. Once the Network address had been entered, continue to Section 4.2.

NOTE: When connecting with a serial server or cellular modem it may be necessary for the Network administrator to set the IP address for local Networks. Cellular modems will usually have a static IP address designated by the carrier.

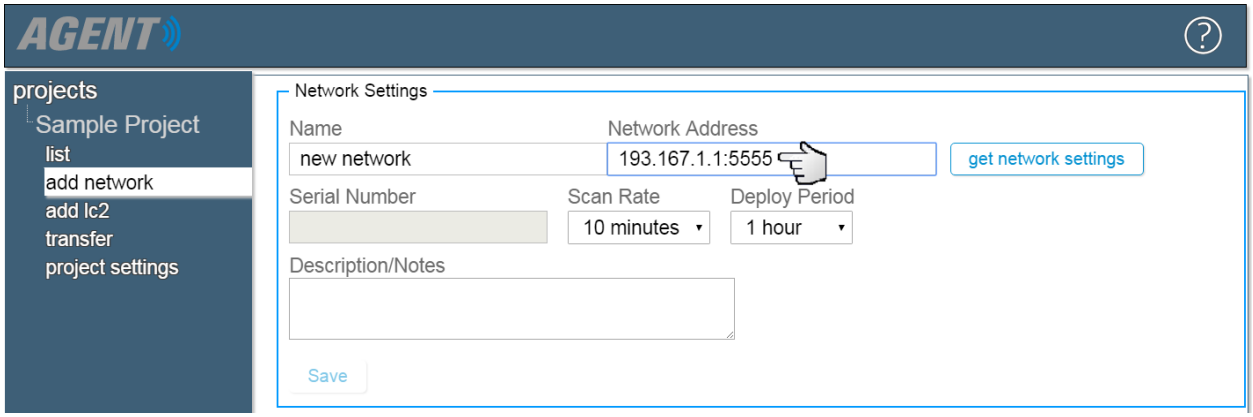

Figure 19 - Enter a URL or IP Address

4.2 Connecting

Once the Network address has been entered, click get network settings. Agent will attempt to connect to the Network Supervisor.

When using a Cellular Gateway Supervisor, after clicking "get network settings" a "Choose Cloud Network" drop-down will appear. The drop-down list will display all Cell Gateway Supervisors associated with that account. Select the desired Supervisor from the list (Figure 20).

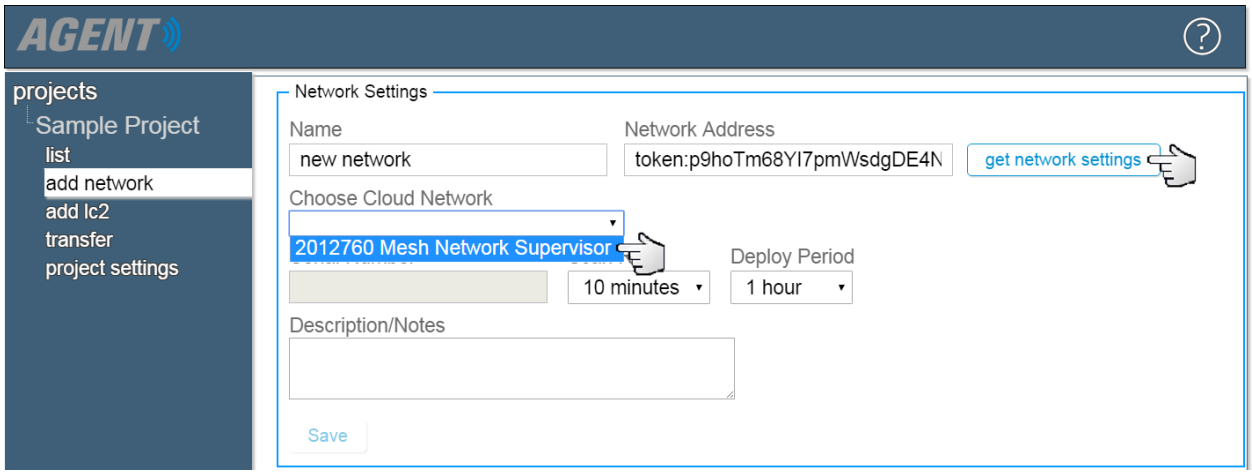

Figure 20 - Select Cellular Gateway Supervisor

Once a connection has been established, the "Serial Number" field will be populated with the serial number of the Supervisor (Figure 21). If Agent fails to establish a connection an error

message will appear, and the reason for the failure will be given if it is available. If this occurs, make sure the Network address is correct, the device is powered on, and the cable connection is secure (if applicable); then try again.

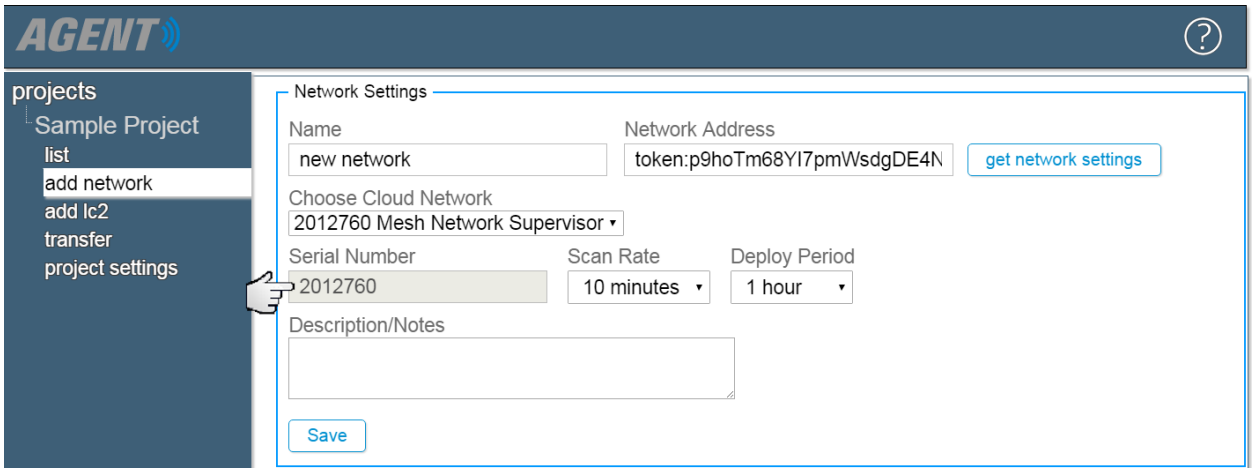

Figure 21 - Populated Serial Number

See Table 1 for more information on the available settings.

Label	Description
Name	Input a name for the Network.
Network Address	The method of connection used for the Network supervisor. Enter a COM port, URL, or IP address with port number.
get network settings	Loads the current scan rate, deploy period, and Network time from the Supervisor.
Choose Cloud Network	Drop-down list showing all Cellular Gateway Supervisors associated with the api.geokon.com account that created the "Token" entered into the Network Address field.
Serial Number	Static field showing the serial number of the Network Supervisor.
Scan Rate	Determines how often Nodes take sensor readings. It may be necessary to temporarily turn off automatic download to change the scan rate of the network. (Should be left at 10 minutes until it has been verified that all Nodes are present and collecting data.)
Deploy Period	Sets how long the Network will remain in "deployment mode", i.e., how long the Supervisor will search for new Nodes. Changes to this setting will take effect the next time Deployment mode is activated on the Network Supervisor. For information on deployment mode, see the GeoNet instruction manual.
Description/Notes	Optional field for user input of any additional information.

Table 1 - Description of Network Settings

When all desired information has been entered click Save. Agent will apply the settings and then navigate to the "Nodes" screen. (Information about the Nodes Screen is provided in Section 4.6.)

4.3 List of GeoNet Networks Associated with a Project

Once Agent has successfully connected to a Supervisor, the Network will be added to the Project. To view the GeoNet Networks associated with a Project, click projects on the left side of the screen, then click the name of the desired Project (Figure 22). This will open the List Screen (Figure 23). For more information about the GeoNet Networks portion of the list screen, refer to Table 2.

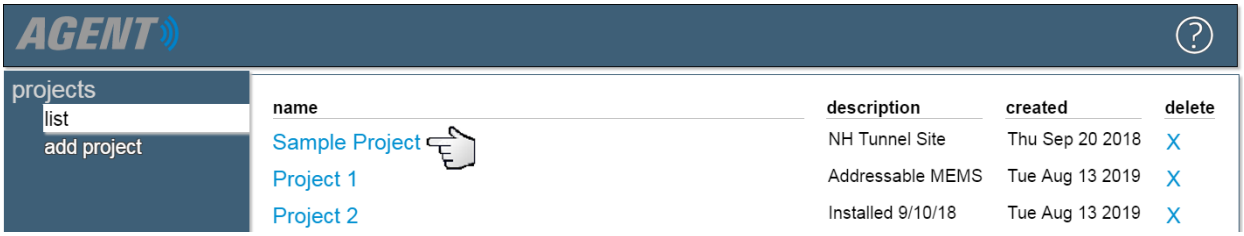

Figure 22 - Select a Project

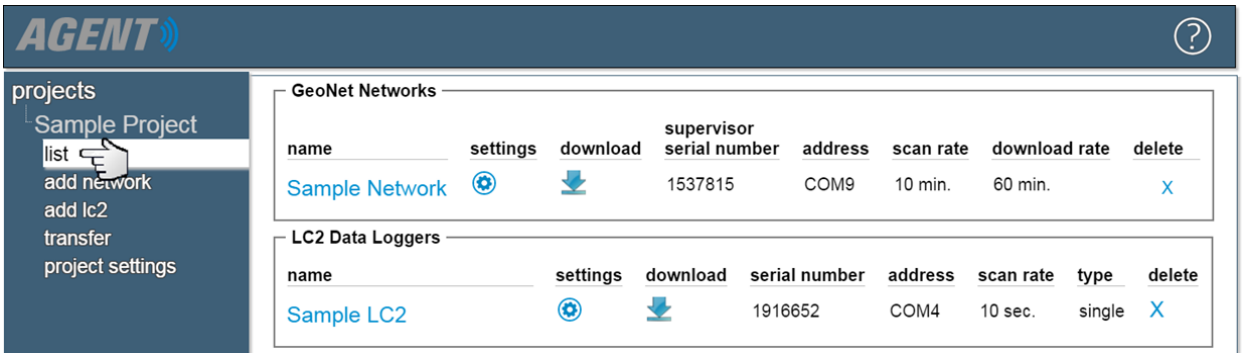

Figure 23 - List Screen

Column Heading	Description
Name	Clicking the name of a Network will open the Nodes Screen. See Section 4.6.
Settings	Click the icon to open Network Settings. See Section 4.4 for more information.
Download	Click the icon to manually download data from the Network. Once the download has begun, a status bar will provide the number of readings available from the Supervisor and the completion percentage. Only one Network can be downloaded at a time. The download will continue whether the user stays on the Network Settings Screen or navigates elsewhere. Click Cancel to stop the download. **NOTE:** When using a Cellular Gateway Supervisor, only data that has been uploaded to the Network Server (cloud) is available for download. Data is sent from the Supervisor to the Network Server in recurring intervals when a certain amount of time has passed, or a set number of readings is reached. Contact Geokon for more information.
Supervisor Serial Number	Static field showing the serial number of the Supervisor.
Address	The method of connection used for the Network supervisor. (COM port, URL, or IP address with port number). See Section 4.1.

Scan Rate	Determines how often Nodes take sensor readings. It may be necessary to temporarily turn off automatic download to change the scan rate of the network. (Should be left at 10 minutes until it has been verified that all Nodes are present and collecting data.)
Download Rate	Displays the frequency of data collection from the Supervisor. Can be edited in Network Settings. See Section 4.4.
Delete	Click X to delete the corresponding Network. Deleting a Network will erase **ALL** data associated with the Network; use with caution.

Table 2 - Descriptions for the GeoNet Networks List

4.4 Network Settings

To edit the Network Settings, select the Project that contains the Network, and then click the icon that corresponds to the Network to be edited. (Network settings can also be accessed by clicking on the name of the Network and then clicking network settings.)

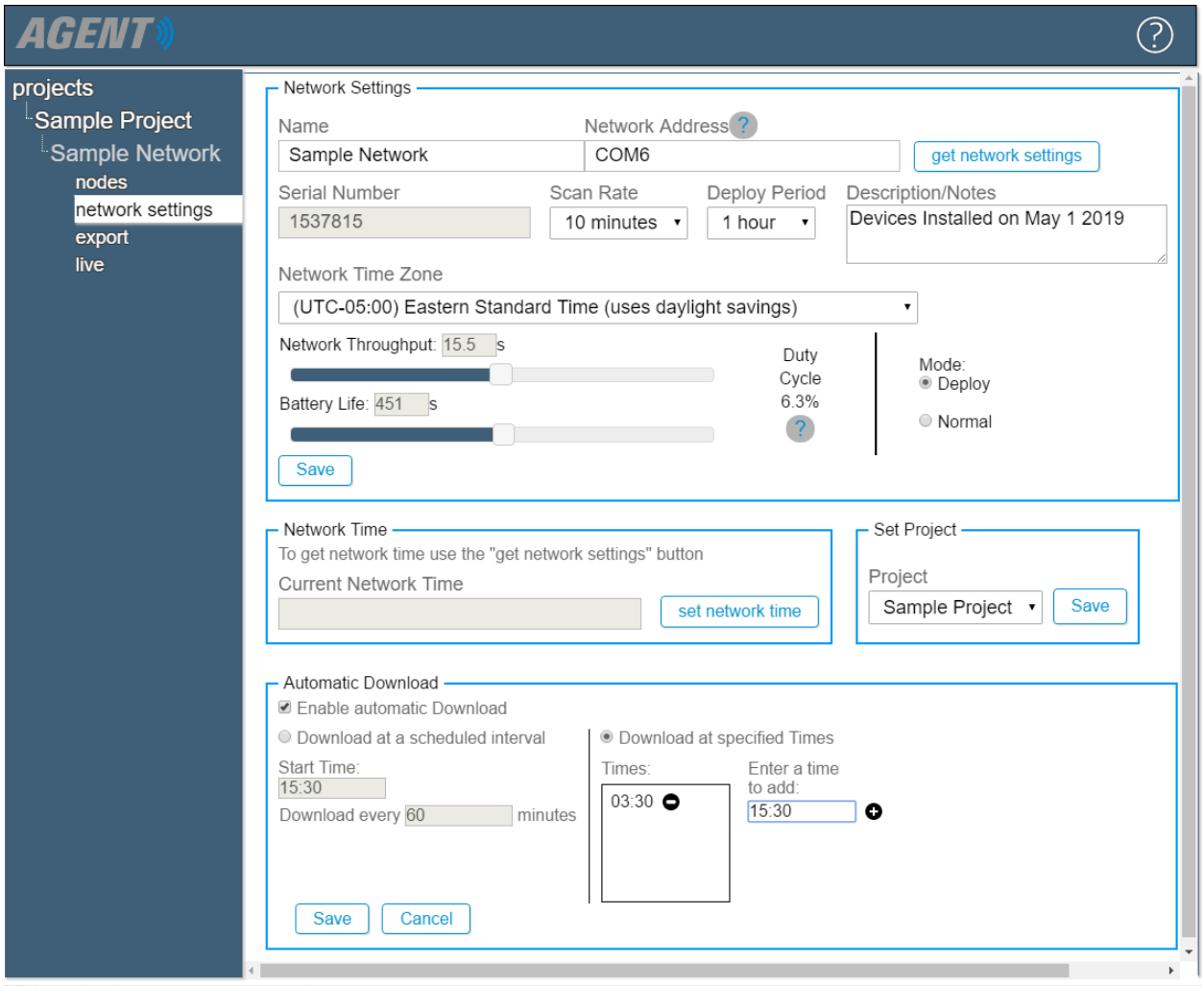

Figure 24 - Network Settings Screen

Refer to Figure 25 through Figure 27 and the accompanying tables for more information on Network settings.

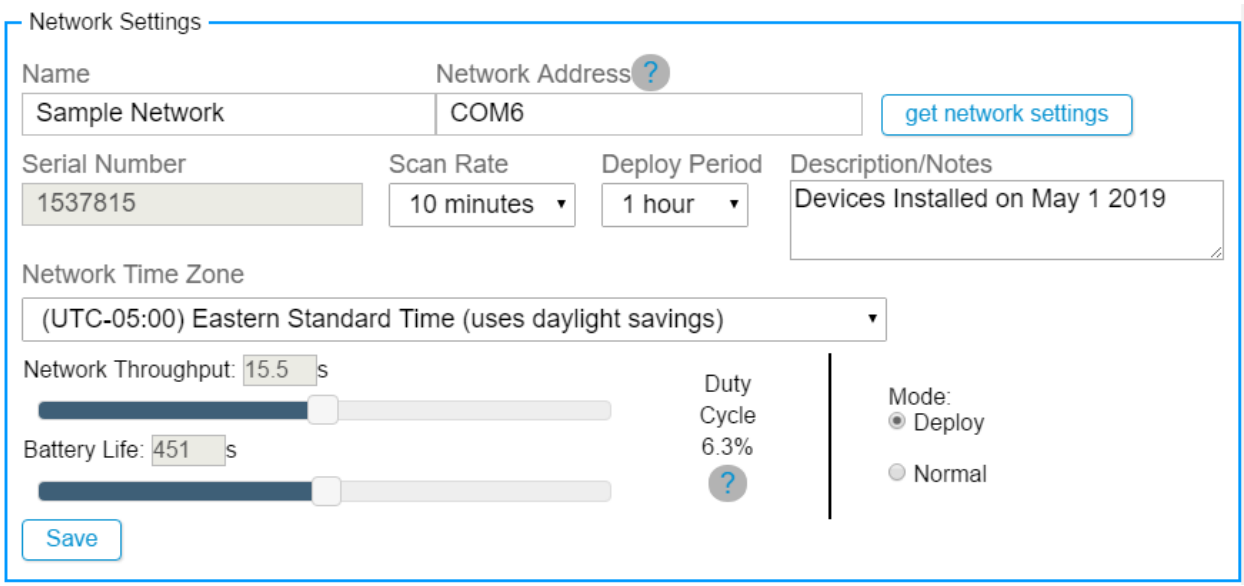

Figure 25 - Network Settings Box

Label	Description
Name	Input a name for the Network.
Network Address	The method of connection used for the Network supervisor. Enter a COM port, URL, or IP address with port number. See Section 4.1 for more information.
get network settings	Loads the current scan rate, deploy period, and Network time from the Supervisor.
Serial Number	Static field showing the serial number of the Network Supervisor.
Scan Rate	Determines how often Nodes take sensor readings. It may be necessary to temporarily turn off automatic download to change the scan rate of the network. (Should be left at 10 minutes until it has been verified that all Nodes are present and collecting data.)
Deploy Period	Sets how long the Network will remain in "Deployment Mode", i.e., how long the Supervisor will search for new Nodes. Changes to this setting will take effect the next time Deployment mode is activated on the Network Supervisor. For information on deployment mode, see the GeoNet instruction manual.
Description/Notes	Optional field for user input of any additional information.
Network Time Zone	Use the drop-down to select the time zone that matches the Network location.
Network Throughput	Use the slider to adjust the "Network Throughput" setting. Increasing the Network Throughput increases the amount of data the network will convey in a given amount of time and decreases the overall battery life. (If nodes frequently fall behind in delivering their readings, increasing the Network Throughput will help.).
Battery Life	Use the slider to adjust the "Battery Life" setting. A higher number will increase the battery life but will also increase the time between when a reading is taken and the data is sent to the supervisor. The minimum setting is limited by the supervisor based on network size. This protects the network from settings that may cause it to stop functioning.

Duty Cycle	The “Duty Cycle” is determined by the Network Throughput and Battery Life settings. The number shown represents the percentage of time the network is "on" and able to transmit data. For maximum battery life the duty cycle should be as low as possible without the network "lagging", i.e., data from certain nodes is older than others or falling behind.
Mode	Select the operating mode of the Network. “Deploy Mode” uses more battery life than “Normal Mode”. Deploy mode is required when setting up a network and whenever changes are being made to the network (adding Nodes, changing batteries, resetting a device, etc.) Refer to the GeoNet instruction manual for more information on the two operating modes of the network.
Save	Saves all fields contained within the “Network Settings” box.

Table 3 - Descriptions for Network Settings Box

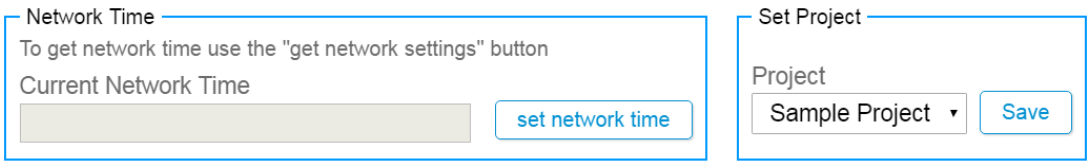

Figure 26 - Network Time and Set Project Boxes

Network Time	
Label	**Description**
Current Network Time	Read only field. Value displayed after pressing the “set Network time” or “get Network settings” buttons.
set network time	Overwrites the current Network time with the date and time from the PC.

Table 4 - Descriptions for Network Time

Set Project	
Label	**Description**
Project	Use the drop-down menu to change the Project the GeoNet Network is linked with.
Save	Moves the Network to the selected Project.

Table 5 - Descriptions for Set Project Box

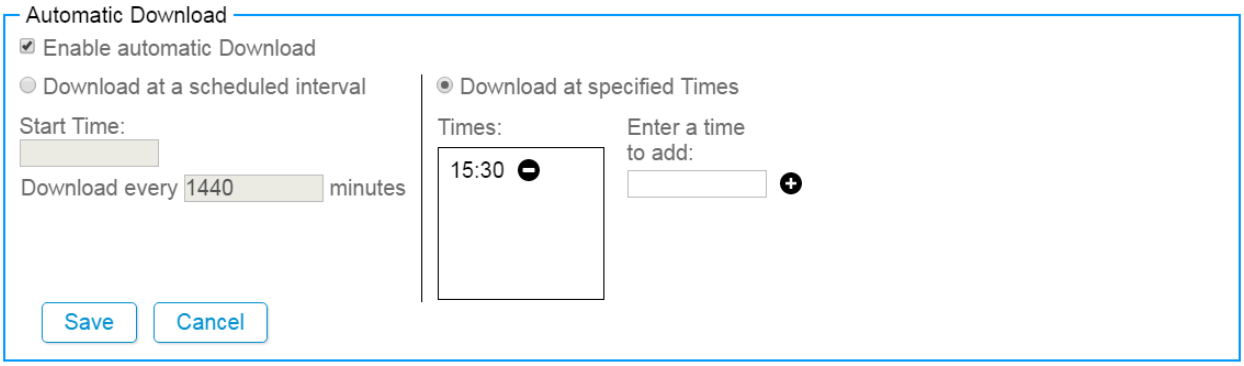

Figure 27 - Automatic Download Box

Label	Description
Enable Automatic Download	Check this box to have data automatically downloaded from the Network at regular intervals. When unchecked, data will only be downloaded when the user initiates a manual download (see Section 4.3).
Download at a scheduled interval	Select this option to have the automatic download recur in intervals. The frequency of the download will be based on the integer entered in the "Download data every __ minutes" field. The first download will occur at the specified "Start time". (Start time must be entered in 24-hour format. For example, 3:30 PM becomes 15:30.)
Download at specified Times	Select this option to have data automatically downloaded at specific times of the day. Enter a time in 24-hour format and then click the ⊕ icon. The time entered will be added to the list of download "Times:". To remove a download time from the list, click the corresponding ⊖ icon.
Save	Saves all fields contained within the "Automatic Download" box.
cancel	Returns settings to their previously saved configuration.

Table 6 - Descriptions for Automatic Download Box

NOTE: When using a Cellular Gateway Supervisor, only data that has been uploaded to the Network Server (cloud) is available for download. Data is sent from the Supervisor to the Network Server in recurring intervals when a certain amount of time has passed, or a set number of readings is reached. Contact Geokon for more information.

4.5 Data Storage Capacity

Data is stored in the Supervisor in a persistent "ring buffer". The flash memory will store around one million arrays. When the memory is full, the oldest data will be overwritten. If automatic download is turned off, data should be collected on a consistent basis to prevent data loss. The equation below can be used to determine how often data must be collected to avoid data loss.

$$\text{Days} = \frac{1{,}040{,}000}{\text{Nodes} \times \text{Arrays Per Day}}$$

Where **Days** is the maximum number of days before data must be collected to prevent loss. The **Arrays per Day** value is provided in Table 7.

Scan Rate	Arrays per Day
10 minutes	144
12 minutes	120
15 minutes	96
20 minutes	72
30 minutes	48
1 hour	24
2 hours	12
3 hours	8
4 hours	6
6 hours	4
8 hours	3
12 hours	2
24 hours	1

Table 7 - Arrays per Day at Each Sample Interval

4.6 List of GeoNet Devices Associated with a Network

To view the Supervisor and Nodes associated with a Network, select the Project that contains the Network and then click on the Network name (Figure 28).

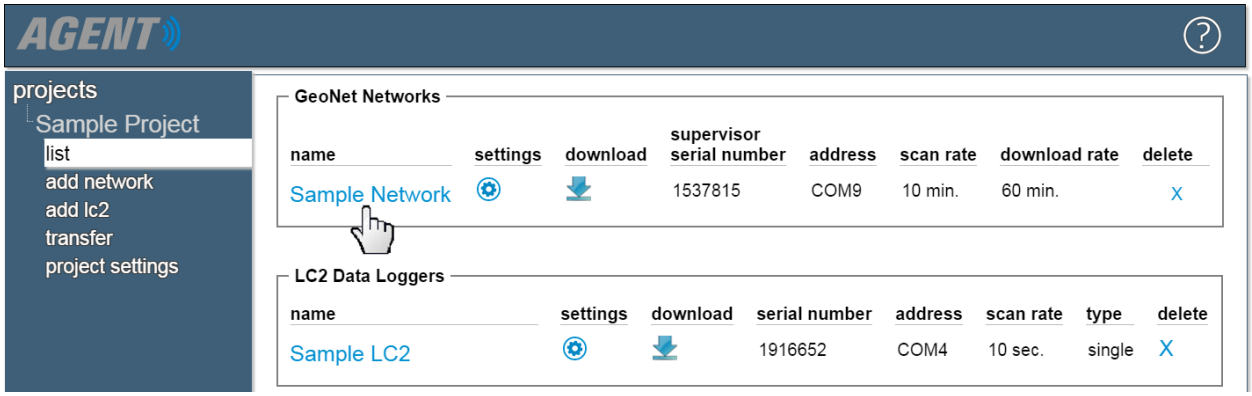

Figure 28 - Selecting a Network

This will open the Nodes Screen (Figure 29). The list of devices can be sorted by clicking on any of the column headers. Refer to Table 8 for more information about the Nodes Screen.

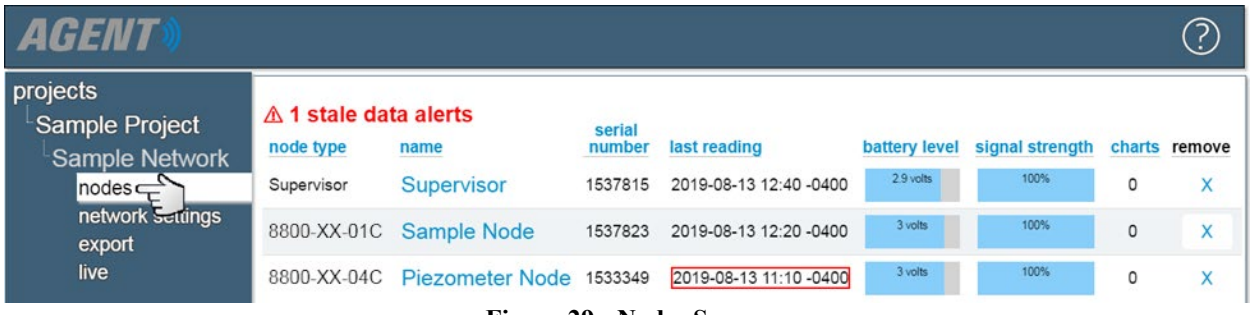

Figure 29 - Nodes Screen

NOTE:

- Only Nodes that have joined the Network will be displayed.
- Nodes added to the Network will not appear on the list until after a data downloaded is performed.
- Data for “last reading”, “battery level”, and “signal strength” will update each time data is downloaded from the Network.

Column Heading	Description
Node Type	Displays the device “Type” selected in the Node Settings Screen. See Section 4.7.
Name	Clicking on the name of a Node or Supervisor will cause Agent to navigate to the settings for that device. See Section 4.7.
Serial Number	Static field showing the factory installed serial number of the device.
Last Reading	Displays the amount of time that has elapsed since the device last communicated with the network.
Battery Level	Displays the current voltage of the batteries of the device. (Updated each time data is downloaded from the Network.) D cell batteries should be replaced when the measured voltage of the D cells drops below 2.0 VDC (units will cease operation at ~2.0 volts). External 12-volt batteries should be replaced when the measured voltage is <11 volts. (Note that some GeoNet models require lithium batteries.)
Signal Strength	Displays the signal strength of the radio communications between the device and the Network. (Updated each time data is downloaded from the Network.) For information on improving the strength of the radio signal, refer to the GeoNet instruction manual.
Charts	Displays the number of charts associated with the device. For information on working with charts see Section 6.
Remove	Click the X icon to remove the corresponding device from the list. This hides the device from being viewed; it does not remove the device from the Network or stop it from collecting data. To rediscover a device, restart the computer or restart the Agent service in task manager.
⚠ Alerts	Alerts are indicated by a message at the top of the Nodes Screen and a red box around the data that triggered the alert. Devices that have not communicated during the last three scan attempts will trigger a “Stale Data” alert. Devices with low battery or signal strength will also trigger an alert.

Table 8 - Descriptions for the Nodes Screen

4.7 Node Settings

To edit the settings of a Node or Supervisor, select a Network, then click on the name of the device to be edited (Figure 30).

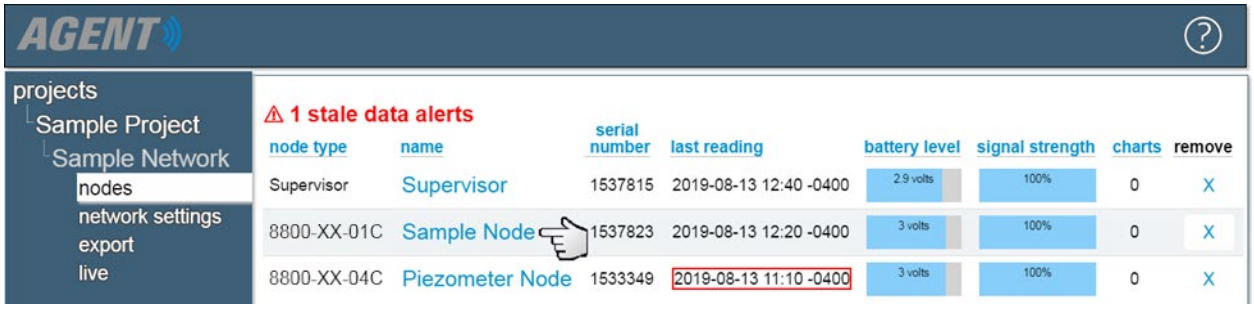

Figure 30 - Select Device

Agent will navigate to the "View Charts Screen". (See Section 6 for information on working with charts.) Click node settings to navigate to the Node Settings Screen (Figure 31).

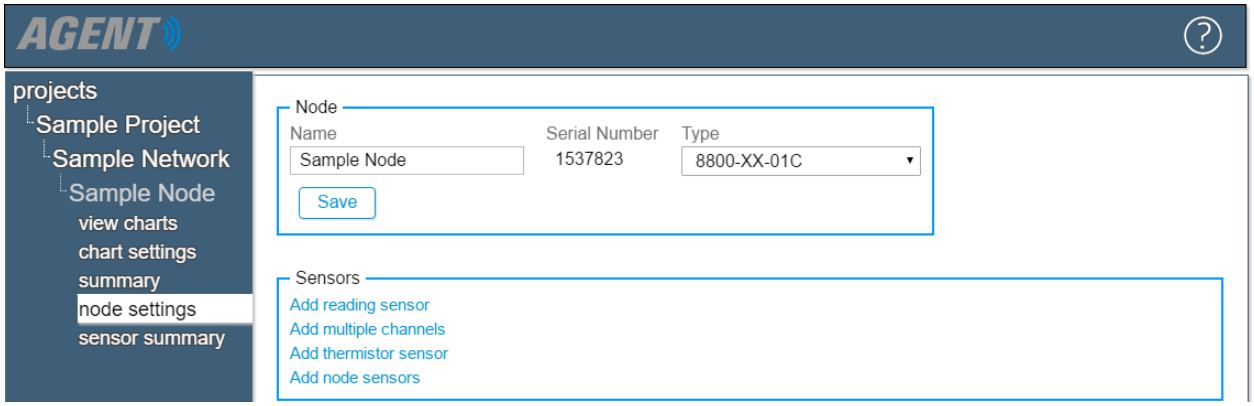

Figure 31 - Node Settings Screen

The Node portion of the screen contains the basic information for that device, including:
Name: This field is used to enter a descriptive name for the selected device.
Serial Number: Static field that displays the serial number of the device.
Type: ***The type does not need to be selected manually unless the physical configuration in the field has changed.*** For current models, select the type based on the last three digits of the model number. Model numbers with "ADR" at the end have three different types available. Refer to Table 9 for more information.

TYPE	ADR
8800-XX-ADR (temp)	Used when a string (bus) of Temperature sensors are connected.
8800-XX-ADR (tilt)	Used when a string(bus) of Tilt sensors are connected.
8800-XX-ADR (VW)	Used when a string (bus) of VW sensors is connected.

Table 9 - Type by Model #

Type selection for legacy models is shown in Table 10 on the following page.

	LEGACY MODELS			
TYPE	*8800-1* *8800-3*	*8800-2* *8800-4*	*8800-5* *8800-6*	*8800-8*
Addressable VW			When used with a string (bus) of VW sensors.	
Single Channel	**X**			
Addressable MEMS			When used with a string (bus) of MEMS sensors.	
Addressable Thermistor			When used with a string (bus) of Temperature sensors	
Supervisor		**X**		
8-CH Multiplexer				**X**
Tilt Two Axes	For Nodes special ordered with a built-in biaxial tiltmeter.			

Table 10 - Type by Model # for Legacy Models

Click save to save any changes made to the "Name" and "Type" fields.

The "Sensors" portion of the Node Settings screen allows sensors to be added to the device. Sensors collect data; this data is then displayed as a line on a chart. (For more information on Charts, see Section 6.) The type of sensors that can be added to a device depends on the selected device "Type" (as described above). Table 11 details the types of sensors available for each device type.

	Sensor Type					
Device Type	*Node Sensor* (Sect. 4.7.4)	*Reading Sensor* (Sect. 4.7.1)	*Thermistor Sensor* (Sect. 4.7.2)	*String of MEMS Angle Sensors* (Sect. 4.7.5)	*String of MEMS Deflection Sensors* (Sect. 4.7.5)	*2 Axis Tilt Meter* (Sect. 4.7.6)
8800-XX-01C	**X**	**X**	**X**			
8800-XX-04C	**X**	**X**	**X**			
8800-XX-08C	**X**	**X**	**X**			
8800-XX-ADR (temp)	**X**		**X**			
8800-XX-ADR (tilt)	**X**			**X**	**X**	
8800-XX-ADR (VW)	**X**	**X**	**X**			

	Sensor Type					
Device Type	*Node Sensor* (Sect. 4.7.4)	*Reading Sensor* (Sect. 4.7.1)	*Thermistor Sensor* (Sect. 4.7.2)	*String of MEMS Angle Sensors* (Sect. 4.7.5)	*String of MEMS Deflection Sensors* (Sect. 4.7.5)	*2 Axis Tilt Meter* (Sect. 4.7.6)
8800-XX-SUP	**X**					
8-Channel Mux	**X**	**X**	**X**			
Addressable MEMS	**X**			**X**	**X**	
Addressable Thermistors	**X**		**X**			
Addressable VW	**X**	**X**	**X**			
Single Channel	**X**	**X**	**X**			
Supervisor	**X**					
Tilt Two Axes	**X**					**X**

Table 11 - Available Sensors by Node Type

4.7.1 Add Reading Sensors

Reading Sensors are used for external sensors (gauges) connected to the device by the user, e.g., piezometers, strain gauges, etc. To add a reading sensor to the device, click "Add reading sensor". (Figure 32).

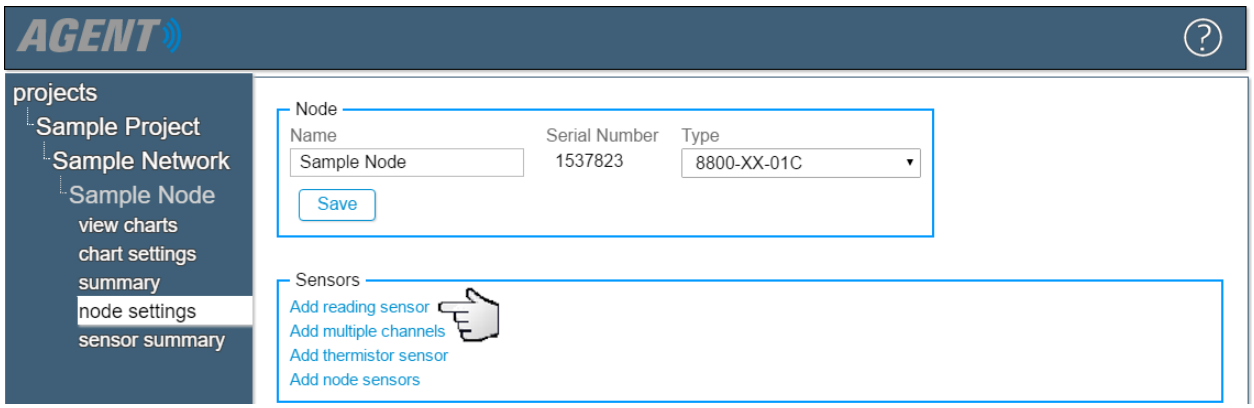

Figure 32 - Add Reading Sensor

This will open the "Edit Sensor" dialog (Figure 33). Table 12 describes the settings contained within the Edit Sensor dialog.

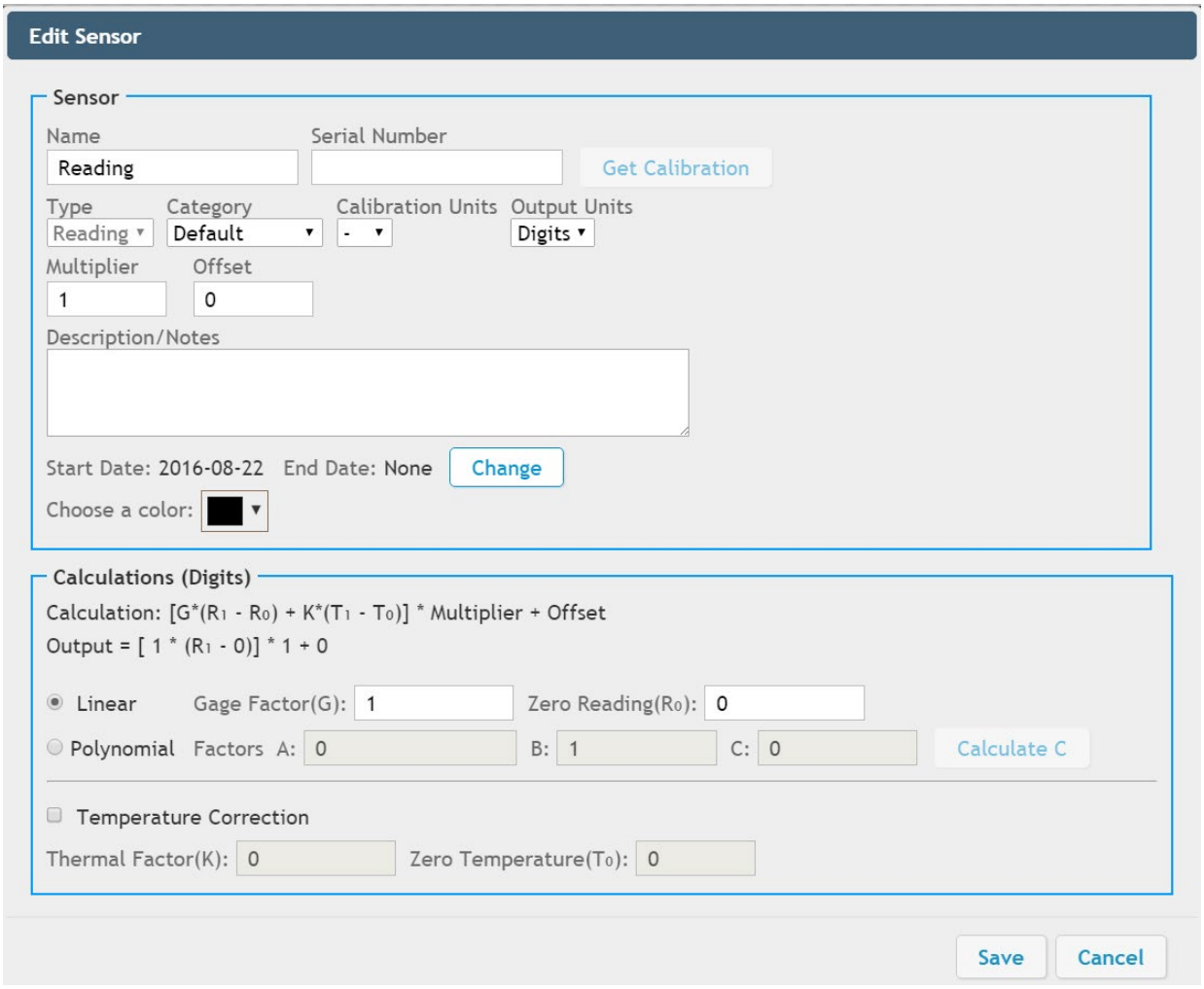

Figure 33 - Edit Reading Sensor

Label	Description
Name	Enter a descriptive name for the sensor.
Serial Number	The serial number of the gauge connected to the Node. (This is not required, but it is recommended to help the user differentiate gauges.)
Get Calibration	Retrieves calibration data from GEOKON's database and populates the Linear Gage Factor (G), as well as the Polynomial gage factors A, B, and C. (Currently, calibration data is only available for piezometers and displacement transducers manufactured after Dec. 2016, MEMS sensors manufactured after Nov. 2017 and load cells manufactured after April 2018.)
Type	Static field showing the sensor type.
Category	Choose the category that coincides with the type of gauge connected. Refer to the manual that was supplied with the gauge if unsure.
Calibration Units	Available Calibration Units will vary based on what category has been chosen. The selected units should match the units of the gauge factor on the calibration report provided with the gauge.
Output Units	Determines the type of engineering units the data will be displayed in.
Multiplier	Applied to the linear or polynomial calculation. Can be used to convert units. If the selected "output units" differ from the "calibration units", Agent will automatically calculate the multiplier to convert the units.

Offset	"Offset" is an optional constant that can be added to the sensor output to adjust the data. For example: If a piezometer installed at a site elevation of -40 feet is reading +2 feet of water, entering an offset of -40 would adjust the reading to -38 feet, the actual water elevation of the sensor.
Description/Notes	Optional field for user input of any additional information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Calculation:	Shows the equation that will be used to calculate the sensor output.
Output =	The output equation is the "Calculation:" equation with user entered integers applied. The output equation will change automatically to reflect the information entered in the dialog.
Linear	Select to utilize the linear calibration equation.
Gage Factor(G)	The default gauge factor of one can be used to output the data in digits. To output the data in other engineering units, the gauge factors found on the GEOKON Calibration Report provided with the vibrating wire sensor must be entered.
Zero Reading(R_0)	Enter the initial onsite zero reading. It is *highly recommended* that an accurate initial zero reading be obtained for each senor, as this reading will be used for all subsequent data reduction. However, the factory zero reading on the calibration report may be sufficient if no onsite zero reading exists. Consult the sensor manual for more information.
Polynomial	Select to utilize the polynomial calibration equation.
Factor A	Required for output in engineering units. Found on the GEOKON Calibration Report provided with the gauge.
Factor B	Required for output in engineering units. Found on the GEOKON Calibration Report provided with the gauge.
Factor C	Value will be displayed after clicking "Calculate C".
Calculate C	Calculates the value of Factor C from a user entered zero reading.
Temperature Correction	If maximum accuracy is desired, or if ambient temperature changes are large, a temperature correction can be applied. Checking this box will include the values entered in the "Thermal Factor" and "Zero Temperature" fields in the output equation.
Thermal Factor(K)	Enter the Thermal Factor from the calibration report.
Zero Temperature(T_0)	If using an onsite zero reading, enter the temperature at which the onsite zero reading was taken in degrees Celsius. If using the factory zero reading, enter the temperature listed on the bottom of the GEOKON Calibration Report.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 12 - Descriptions for Reading Sensors

Once a Sensor has been created, it will be added to the list of sensors on the Node Settings Screen (Figure 34).

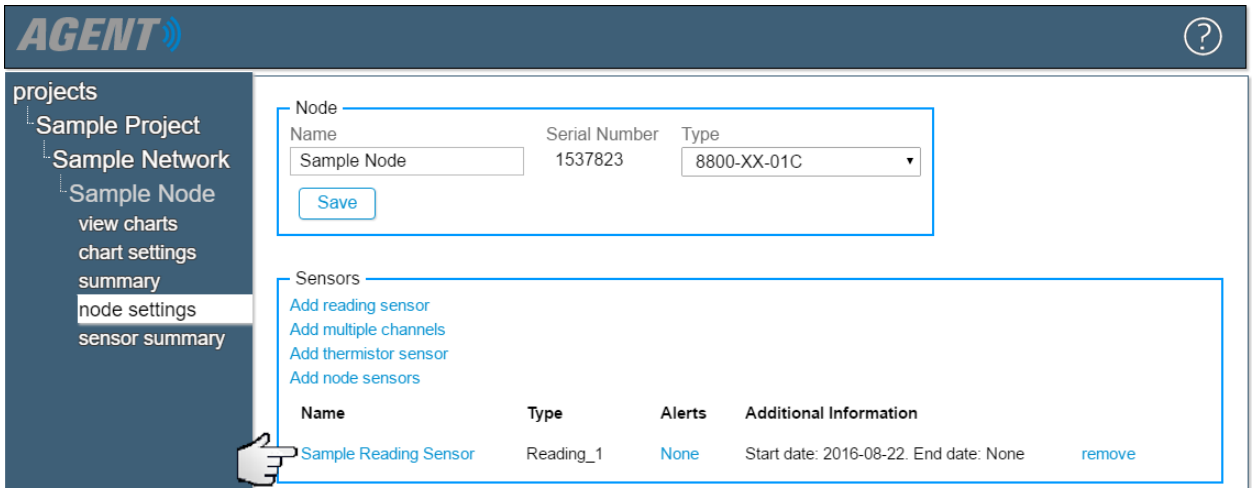

Figure 34 - List of Sensors

The sensor settings can be accessed at any time by clicking on the name of the sensor.

The "Alerts" column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

4.7.2 Add Thermistor Sensor

Most GEOKON vibrating wire sensors include a built-in thermistor. To view the temperature data collected by the thermistor, a "thermistor sensor" must be added in Agent. To add a thermistor sensor, click Add thermistor sensor (Figure 35).

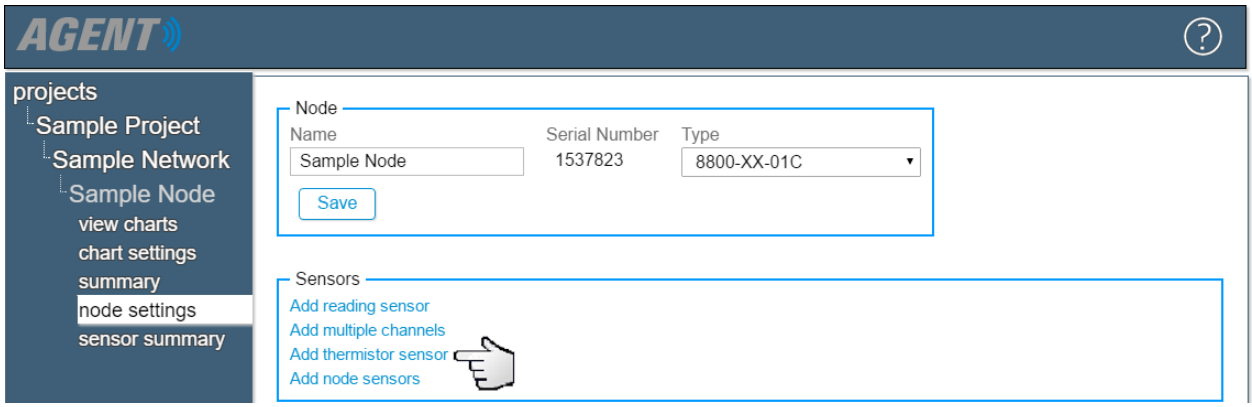

Figure 35 - Add Thermistor Sensor

The "Edit Sensor" dialog will open (Figure 36). Table 13 describes the available thermistor settings.

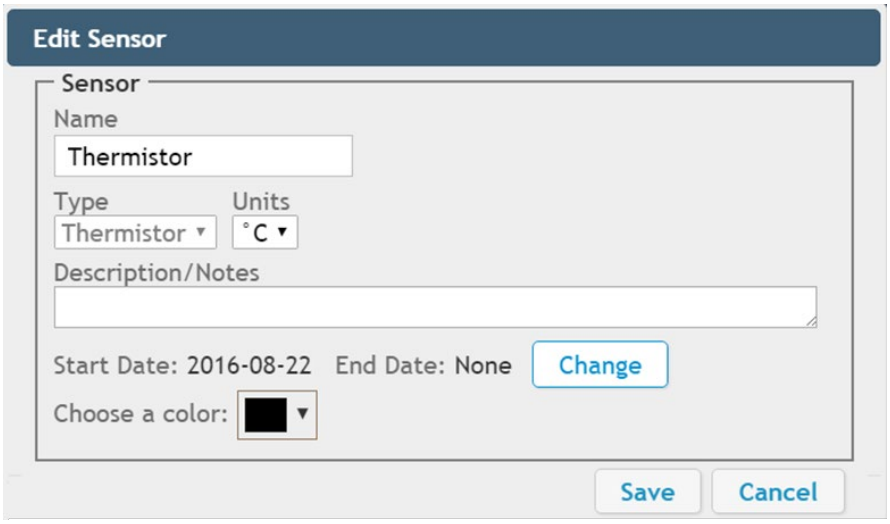

Figure 36 - Edit Thermistor Sensor

Label	Description
Name	Enter a descriptive name for the sensor.
Type	Static field displaying the sensor type. **Note:** Can be used to select individual thermistors for Model 3810A Addressable Thermistor Strings. See Section 4.7.2.2 below for more information.
Units	Select whether to display thermistor data in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Description/Notes	Optional field for user input of any additional information. Can also be used to set a thermistor value when using high temperature sensors or thermistors. See Section 4.7.2.1 below for more information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns the settings to their previously saved configuration.

Table 13 - Descriptions for Thermistor Sensors

Once a Sensor has been created, it will be added to the list of sensors on the Node Settings Screen (Figure 37).

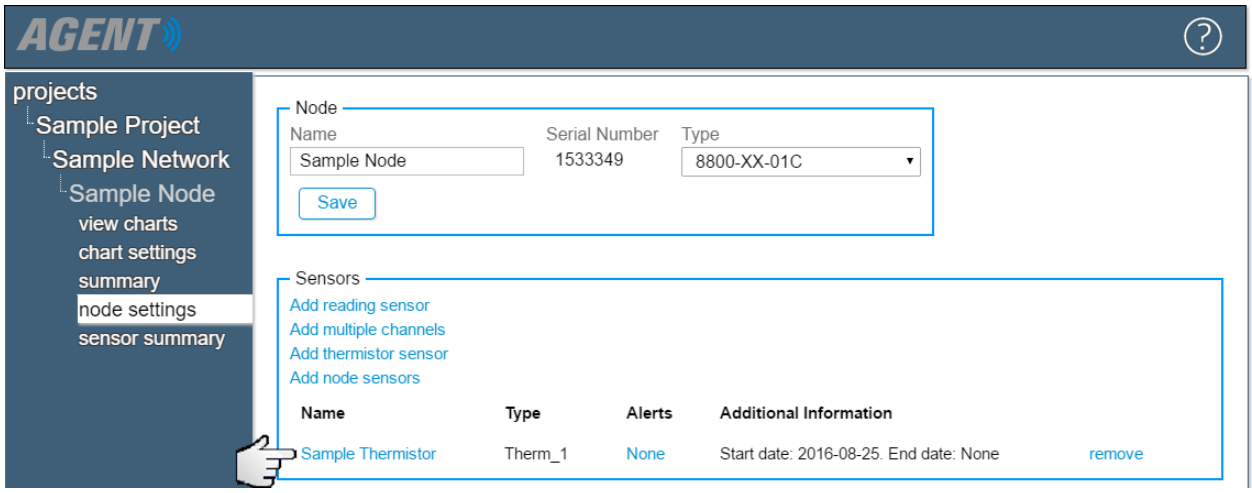

Figure 37 - List of Sensors

The sensor settings can be accessed at any time by clicking on the name of the sensor.

The "Alerts" column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

4.7.2.1 High Temperature (HT) Sensors

Geokon's high temperature sensors use a different thermistor than standard sensors. When using a high temperature sensor or thermistor, the thermistor value must be set using the "Description/Notes" field. For 8.2k Ω resistance thermistors, enter "value=8200". For 10k Ω resistance thermistors, enter "value=10000". Figure 38 on the shows an example of setting the value for 8.2k thermistors.

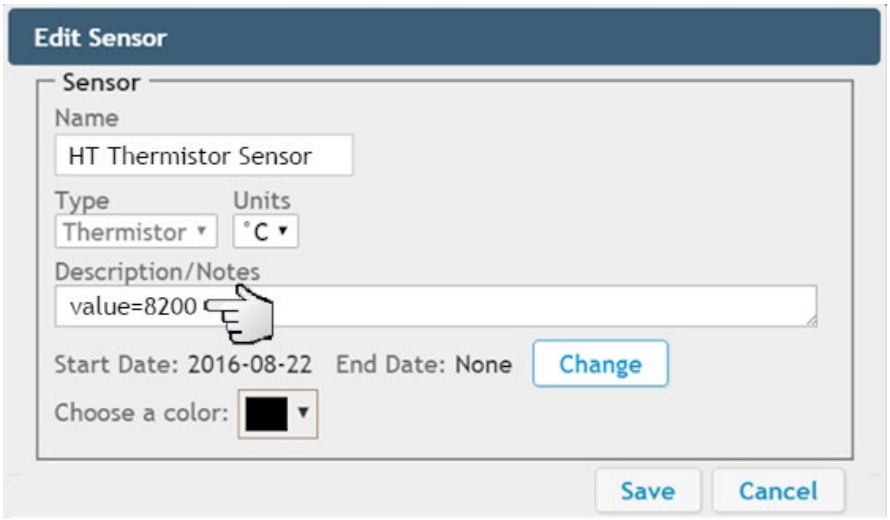

Figure 38 - Changing Thermistor Value for HT Sensors

4.7.2.2 Model 3810A Addressable Thermistor Strings

For Model 3810A Addressable Thermistor strings, the Type in the Nodes Settings screen must be set to "8800-XX-ADR (temp)" (Figure 39).

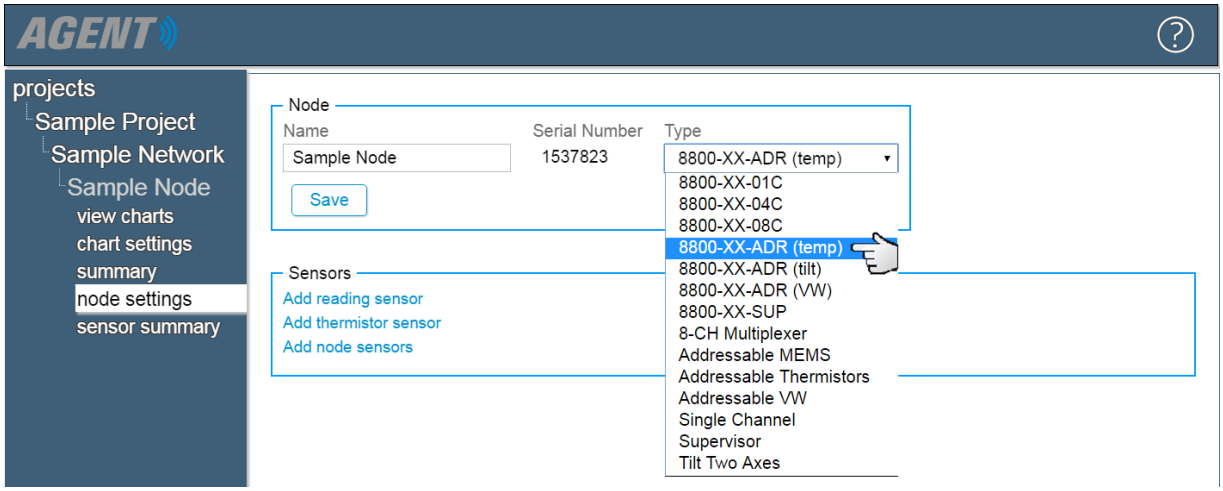

Figure 39 - Set Type to 8800-XX-ADR (temp)

This will allow up to 80 thermistors to be assigned to the Node. Click "Add thermistor sensor" (Figure 40) and then select the thermistor to add (Figure 41). Repeat this process for each thermistor in the string.

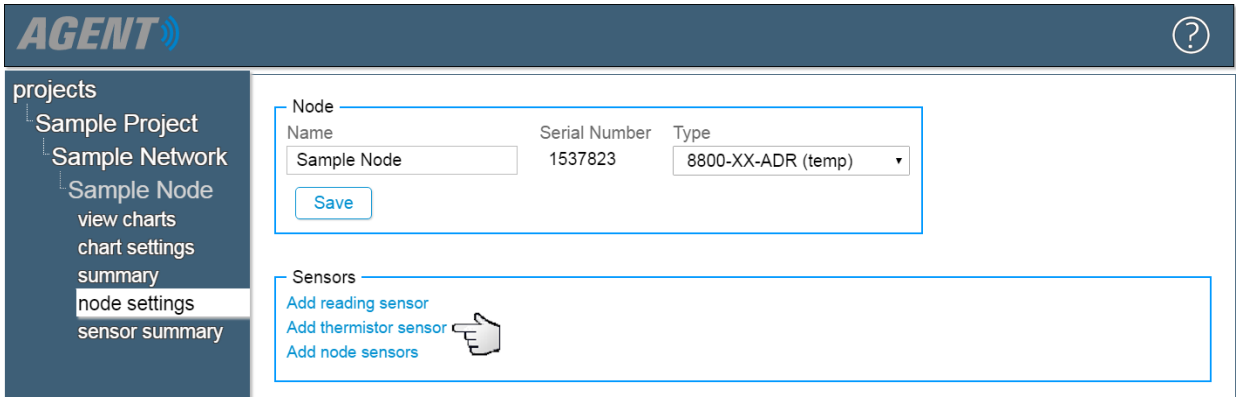

Figure 40 - Add Thermistor Sensor

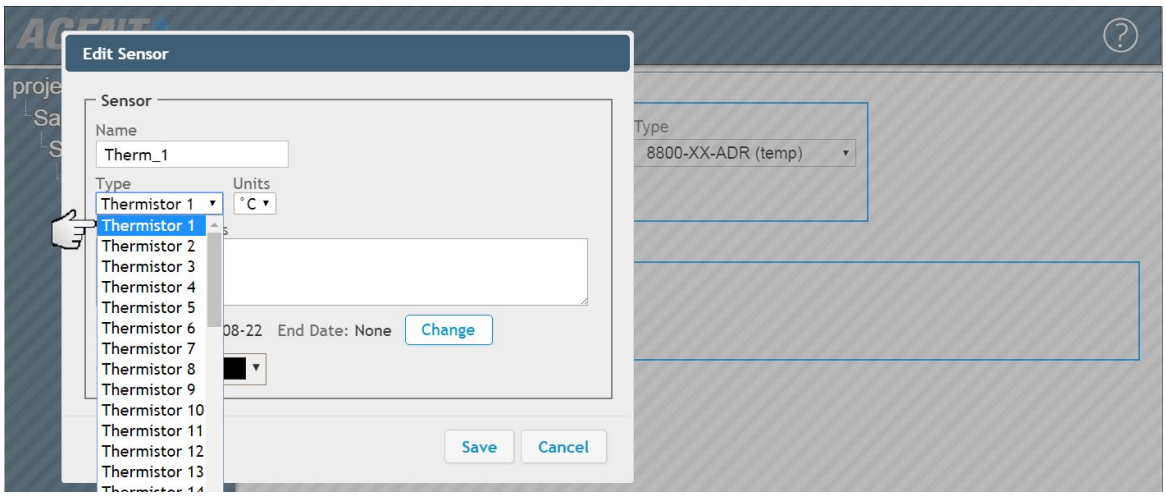

Figure 41 - Select the Thermistor to Add

4.7.3 Add Multiple Channels

The “Add Multiple Channels” is designed to be used with Multi-Channel Nodes and allows multiple reading and thermistor sensors to be added at one time. Clicking “Add Multiple Channels” (Figure 42) will open a dialog titled “Add a Collection of Channels” (Figure 43)

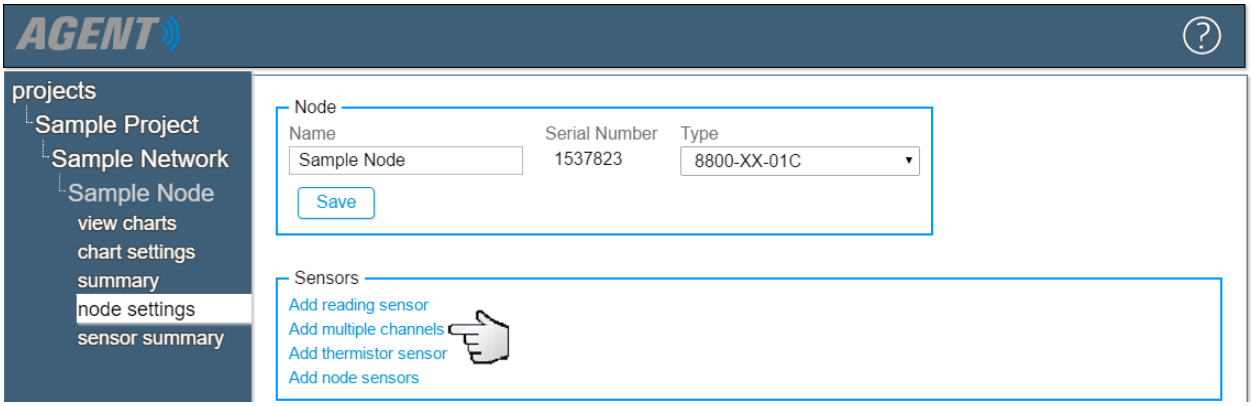

Figure 42 - Add Multiple Channels

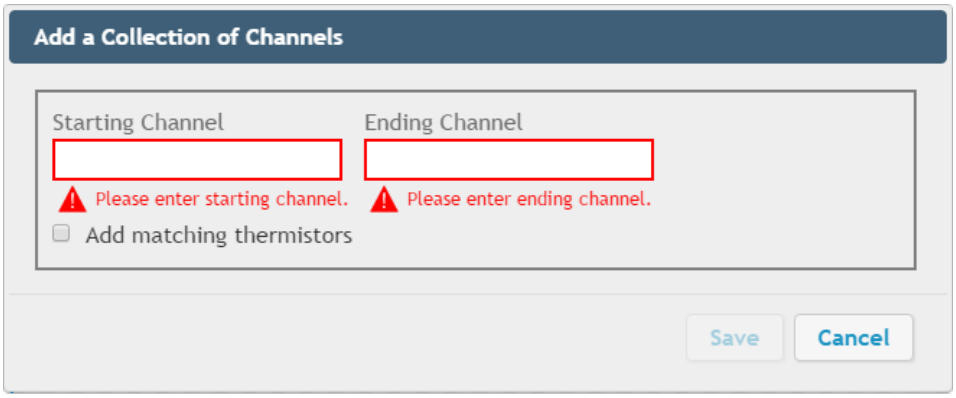

Figure 43 - Add a Collection of Channels Dialog

Enter the range of channels on the Node which have a sensor wired into them. (Channel numbers coincide with terminal blocks inside the Node. Refer to the GeoNet manual for more information.) If the sensors attached to the Node have internal thermistors, check the “Add matching thermistors” box.

If more than one range is required, save the information and then repeat the process. (Alternatively, add all the channels at once and then delete the unused channels after they are created.)

Figure 44 shows an example of adding channels one through six with matching thermistors and the resulting sensors in the Node Setting screen.

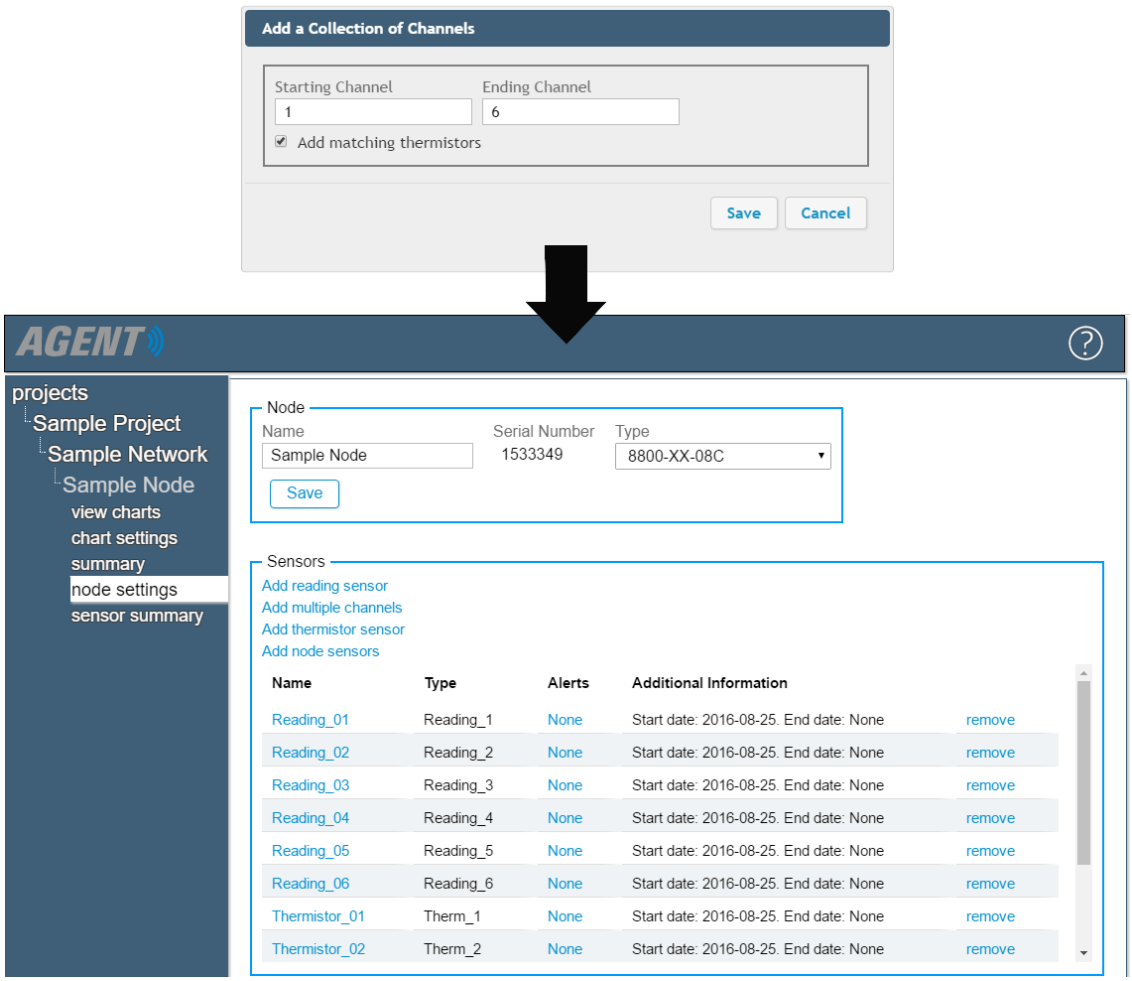

Figure 44 - Multiple Reading and Thermistor Sensors Added

4.7.4 Node Sensors

Node sensors are factory installed sensors contained within the device. To add a Node sensor to the device, click Add node sensors (Figure 45).

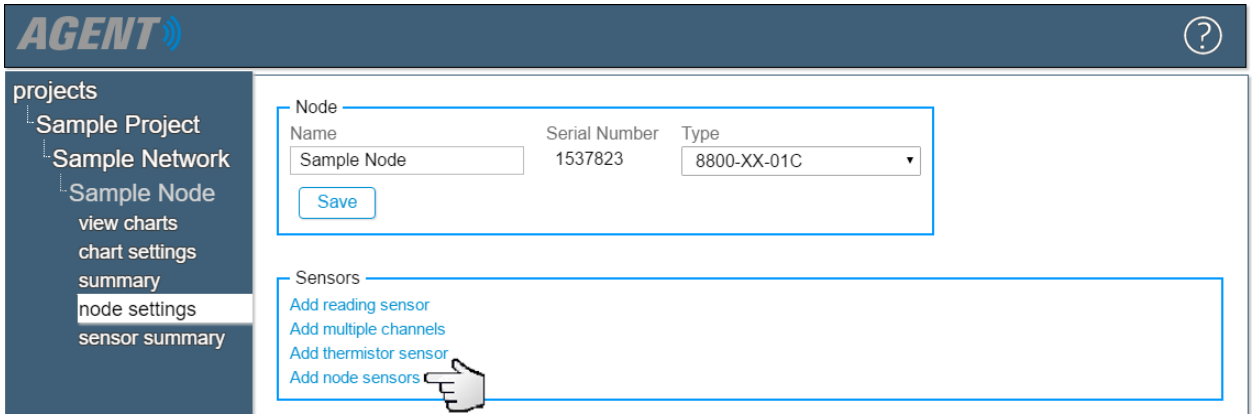

Figure 45 - Add Node Sensors

This will open the "Edit Sensor" dialog (Figure 46).

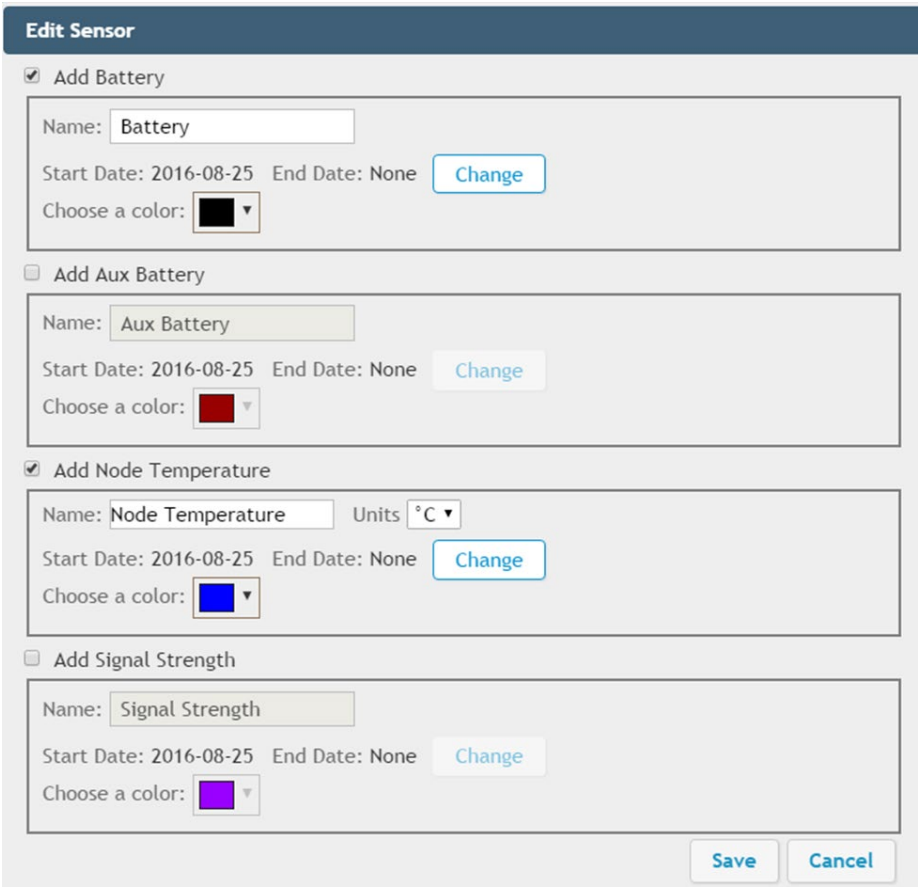

Figure 46 - Edit Node Sensor

To add a sensor, check the appropriate box. More than one sensor can be added at a time by checking multiple boxes. Once a sensor's box has been checked, the information that coincides with that sensor can be edited. See Table 14 for more information.

Label	Description
Name	Enter a descriptive name for the sensor.
Units	Only available on Node Temperature sensors. Determines whether the Node temperature will be displayed in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 14 - Descriptions for Node Sensors

Once a Sensor has been created, it will be added to the list of sensors on the Node Settings Screen (Figure 47).

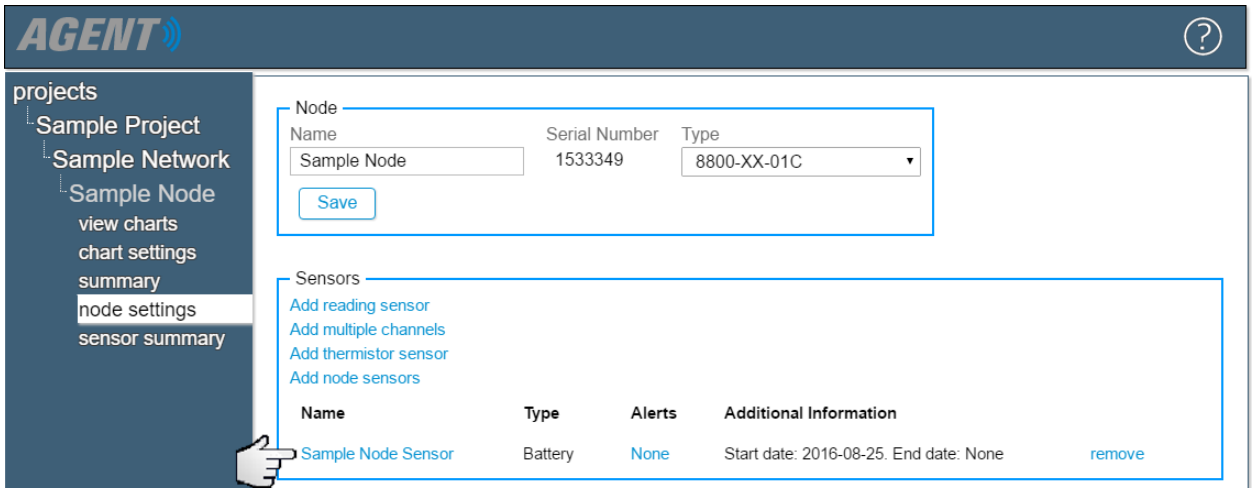

Figure 47 - List of Sensors

The sensor settings can be accessed at any time by clicking on the name of the sensor.

The "Alerts" column can be used to create alerts that will be displayed on a chart when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

4.7.5 String of MEMS Sensors

To add a string of MEMS sensors to a device, navigate to the Node Settings Screen as described in Section 4.7. (Note that String of MEMS sensors are only available for Nodes that have the device "Type" saved as 8800-XX-ADR (tilt) or "Addressable MEMS".)

MEMS Angle sensors show the change of ***angle*** occurring in the MEMS string. MEMS deflection sensors show the change of ***deflection*** occurring in the MEMS string. To add a string of Angle Sensors, see Section 4.7.5.1, for Deflection Sensors, see Section 4.7.5.2.

4.7.5.1 Adding a String of MEMS Angle Sensors

To add a string of MEMS Angle Sensors, click Add string of MEMS angle sensors (Figure 48).

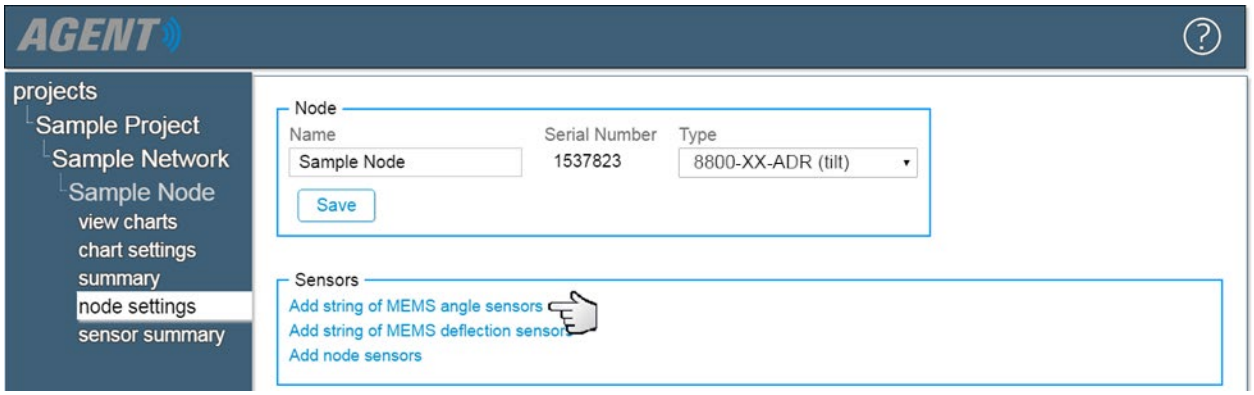

Figure 48 - Add a String of MEMS Angle Sensors

This will open the “Edit Angle MEMS” dialog (Figure 49).

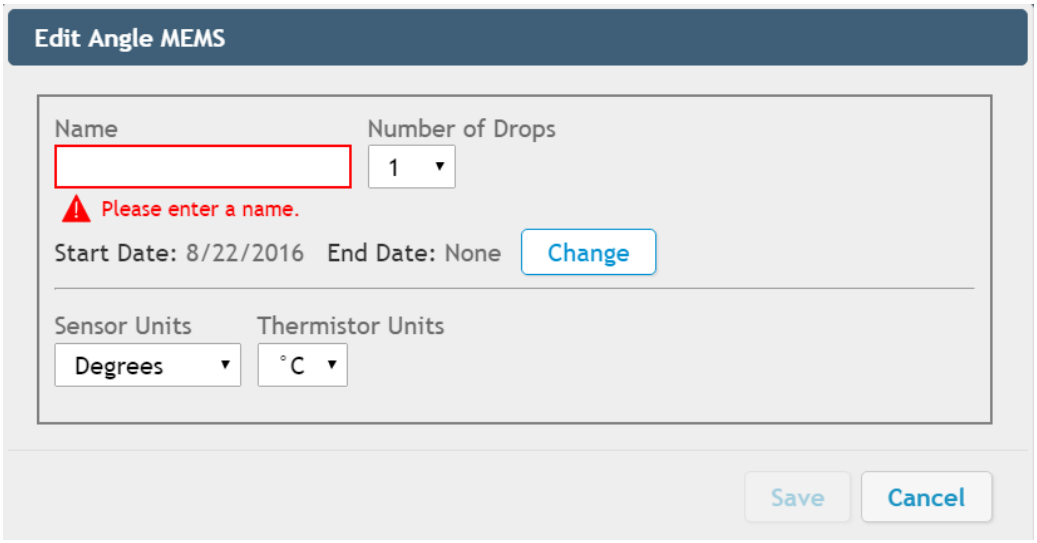

Figure 49 - Edit Angle MEMS Dialog

Table 15 describes the available settings.

Label	Description
Name	Enter a descriptive name for the thermistor.
Number of Drops	Select the number of Sensors in the String (16 maximum). **NOTE:** This field MUST MATCH the actual number of drops on the string; if set incorrectly, no data will be displayed.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Sensor Units	Determines whether the reading will be displayed in Degrees, Radians, or Arcseconds.
Thermistor Units	Determines whether the thermistor reading will be displayed in degrees **C**elsius, **F**ahrenheit, or **K**elvin.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 15 - Descriptions for Edit Angle MEMS Dialog

Once a Sensor has been created, it will be listed on the Node Settings Screen as shown in Figure 34.

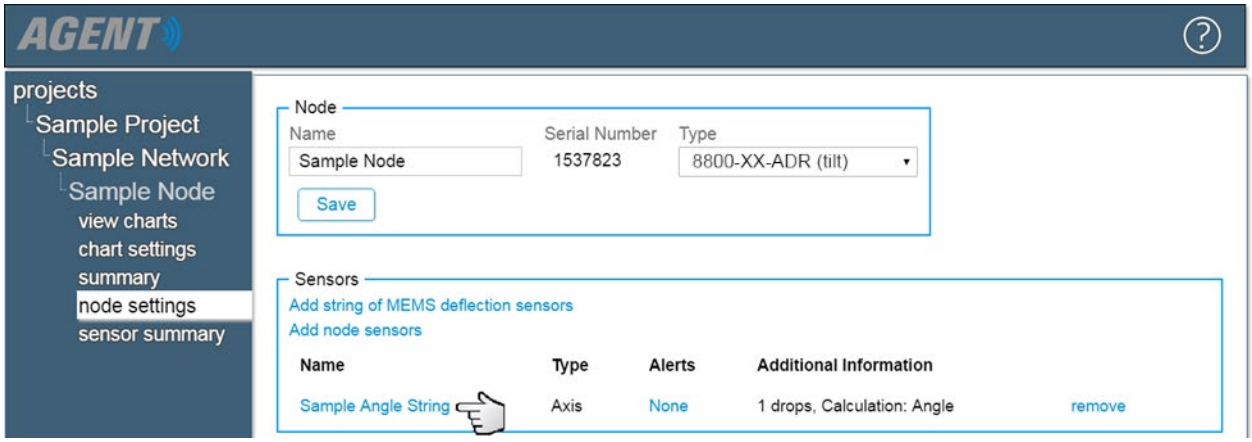

Figure 50 - List of Sensors

The string settings can be accessed at any time by clicking on the name of the sensor. (Additional settings are available for MEMS sensors after the sensor has been created. These settings are described in the Sections 4.7.5.3 through 4.7.5.9.)

The "Alerts" column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

4.7.5.2 Adding a String of MEMS Deflection Sensors

To add a string of MEMS Deflection Sensors, click Add string of MEMS deflection sensors (Figure 51).

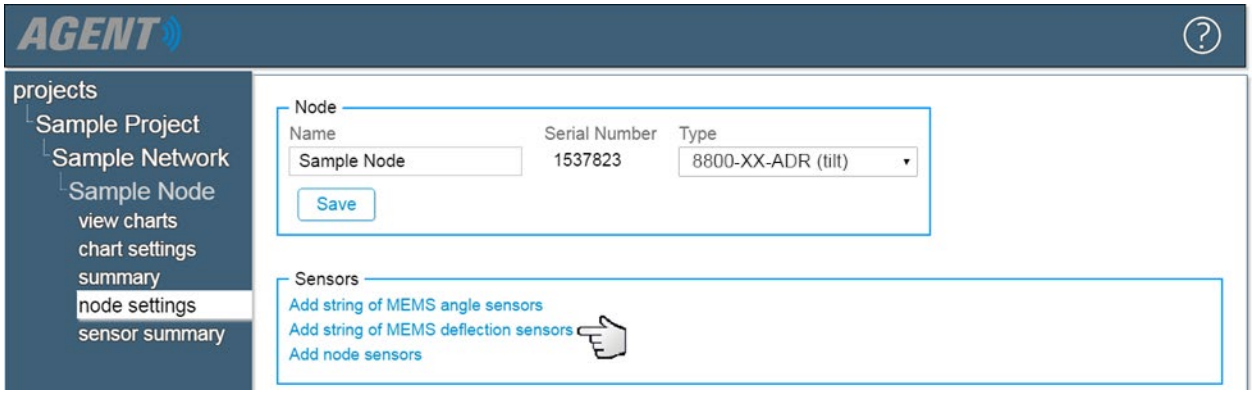

Figure 51 - Add a String of MEMS Deflection Sensors

This will open the "Edit Deflection MEMS" dialog (Figure 52). Table 16 describes the available settings.

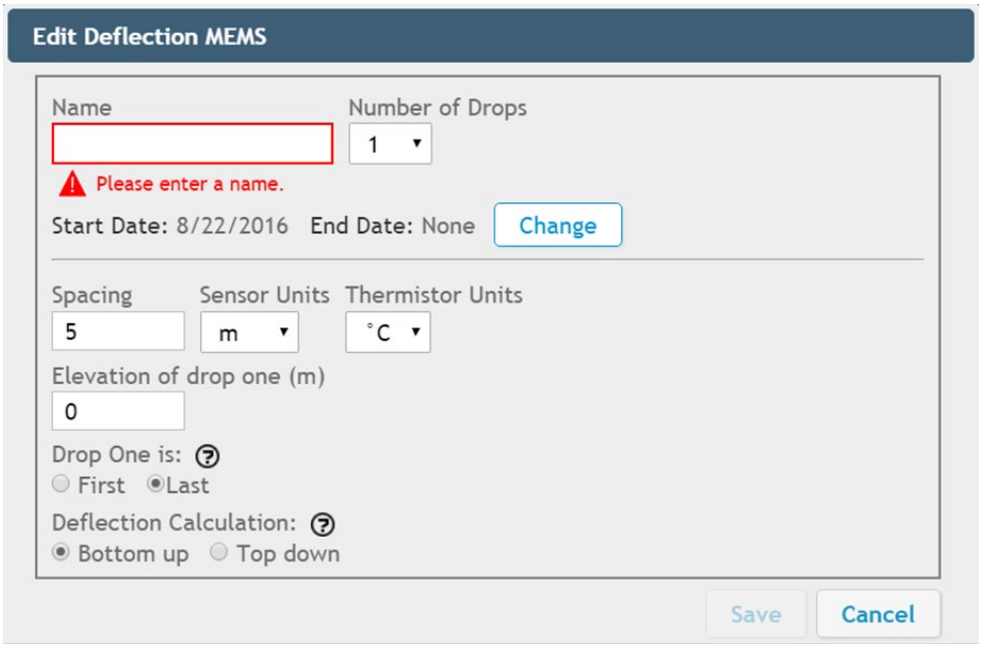

Figure 52 - Edit Deflection MEMS Dialog

Label	Description
Name	Enter a descriptive name for the MEMS string.
Number of Drops	Select the number of Sensors in the String (16 maximum). **NOTE:** This field MUST MATCH the actual number of drops on the string; if set incorrectly, no data will be displayed.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Spacing	This field along with the "Sensor Units" field defines the distance between the drops.
Sensor Units	Determines the unit of measure for the spacing of the drops. Also determines what unit the data will be displayed in.
Thermistor Units	Determines whether the thermistor reading will be displayed in degrees **C**elsius, **F**ahrenheit, or **K**elvin.
Elevation of drop one (m)	Input the distance to "drop one" of the string in Meters
Drop One is:	Indicate whether the sensor to be dedicated as "drop one" is at the top or the bottom of the string.
Deflection Calculation	Select whether the deflection should be calculated from the bottom up or from the top down.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 16 - Descriptions for Edit Deflection MEMS Dialog

Once a Sensor has been created, it will be listed on the Node Settings Screen (Figure 34).

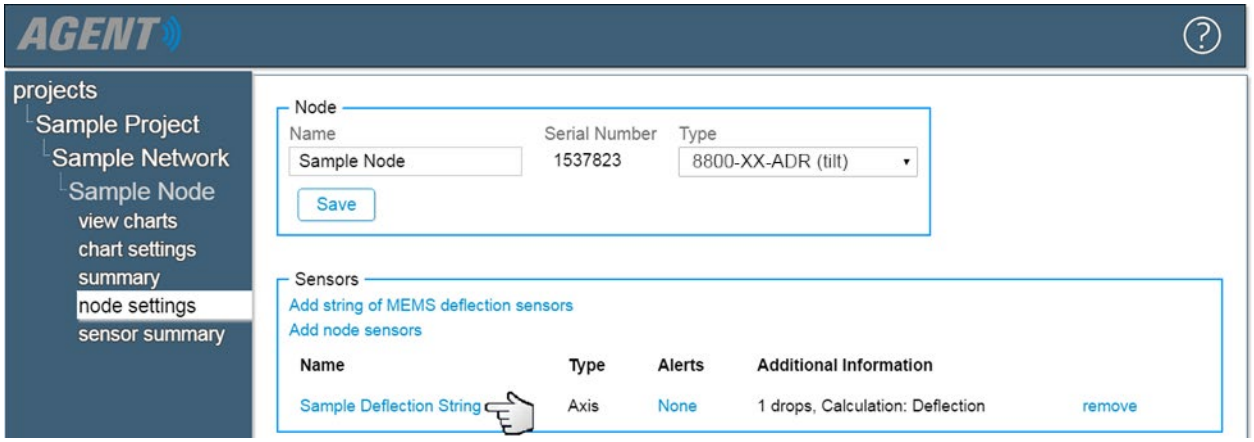

Figure 53 - List of Sensors

The string settings can be accessed at any time by clicking on the name of the sensor. (Additional settings are available for MEMS sensors after the sensor has been created. These settings are described in the Sections 4.7.5.3 through 4.7.5.9.)

The "Alerts" column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

4.7.5.3 Editing a MEMS String

To edit a MEMS string, click the name of the desired sensor (Figure 54).

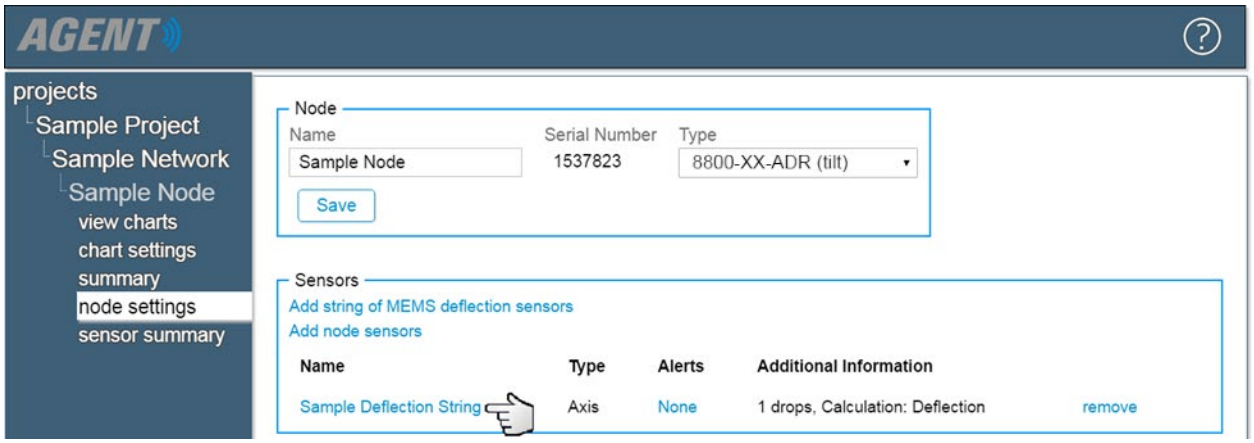

Figure 54 - Editing MEMS Sensors

This will open the "Edit MEMS String" dialog (Figure 55).

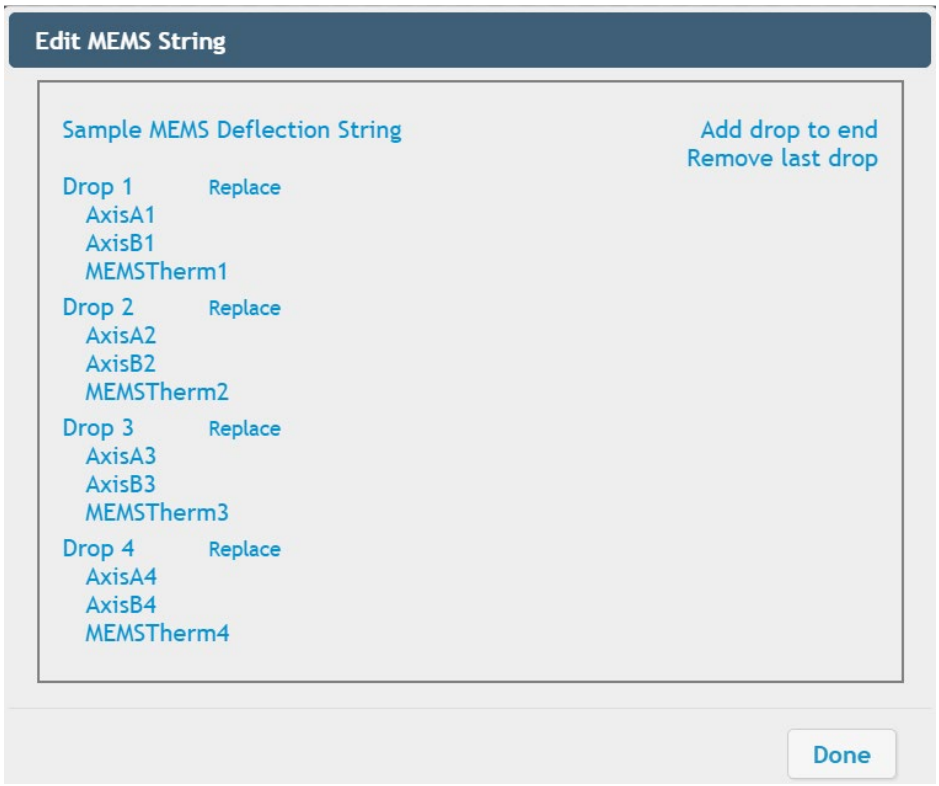

Figure 55 - MEMS Sensor Settings

The "Edit MEMS string" dialog is navigated by using the tree on the left side of the screen. At the top of the tree is the sensor name, followed by a list of drops, with the A and B axis listed below each drop. Clicking on an item in the tree will open the settings for that specific item. Refer to the sections below for more information.

4.7.5.4 Overall String Settings

Clicking on the sensor name (Figure 56) will open a similar "Edit MEMS" dialog to the one that was used to add the sensor. See Sections 4.7.5.1 and 4.7.5.2 above for descriptions of these settings. (NOTE: When editing an existing string, the "Number of drops" setting is not available. To change the number of drops in a string, use "Add drop to end" or "Remove last drop" as explained in the next section.

Figure 56 - Click on String Name

4.7.5.5 Adding or Removing a Drop

The number of drops in the sensor must match the number of drops in the MEMS hardware or no data will be displayed. The number of drops can be changed by clicking one of the links in the top right corner of the Edit MEMS String dialog (Figure 57).

Figure 57 - Add or Remove Drop

Drops can be added to the end of the string, one at a time, by clicking Add drop to end. MEMS strings can have a maximum of 16 drops. Once the maximum number of drops has been reached, the "Add drop to end" link will disappear. The link will reappear if a drop is removed so that the string has less than the maximum allowed.

Drops can be deleted from the end of the string, one at a time, by clicking Remove last drop. If there is only one drop left on the string, the "Remove last drop" link will disappear. The link will reappear if a drop is added so that the string has more than the minimum allowed.

4.7.5.6 Drop Settings

Clicking on the name of a drop (Figure 58) will open the "Edit MEMS Drop" dialog (Figure 59).

Figure 58 - Click on Drop Name

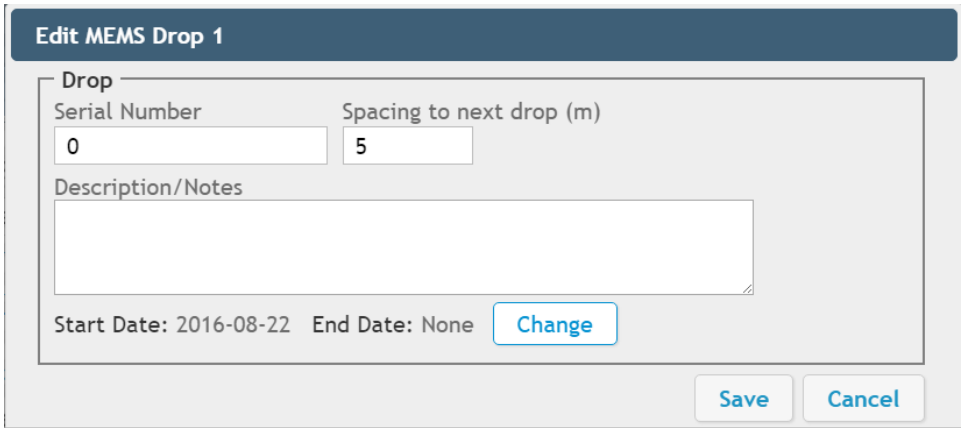

Figure 59 - Edit MEMS Drop Dialog

Drop settings are as follows:

Label	Description
Serial Number	Enter the serial number of the drop. (This is not required, but it is recommended to help the user differentiate drops.)
Spacing to Next Drop	Input the distance between the selected drop and the next drop in the string.
Description/Notes	Optional field for user input of any additional information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 17 - Drop Settings

4.7.5.7 Axis Settings

Clicking on the name of an axis (Figure 60) will open the "Edit Sensor" dialog for that axis (Figure 61).

Figure 60 - Click on Axis Name

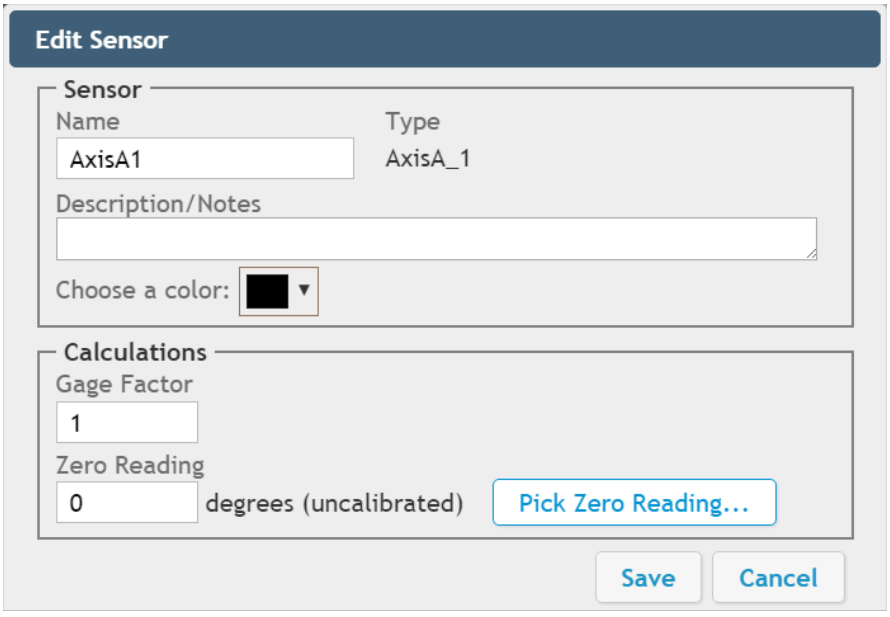

Figure 61 - Axis Settings

Axis settings are as follows:

Label	Description
Name	Enter a descriptive name for the axis.
Type	Static field showing the axis letter and drop number.
Description/Notes	Optional field for user input of any additional information.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Gage Factor	All MEMS sensors have a gauge factor of one, nominally. Please contact GEOKON for more information.
Zero Reading	Enter the initial onsite zero reading. It is *highly recommended* that an accurate initial zero reading be obtained for each senor, as this reading will be used for all subsequent data reduction. Consult the sensor manual for more information. (Note that setting the zero readings will cause MEMS deflection charts to display the deflection from the specified zero line, rather than as a profile of the borehole. See Section 6.3.2 for more information on MEMS deflection charts.)
Pick Zero Reading...	Opens the "Pick Zero Reading" dialog box, which is used to select a reading downloaded from the Network be used as the sensor's "Zero Reading".
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 18 - Descriptions for Axis Settings

4.7.5.8 Thermistor Settings

Clicking on the name of a thermistor (Figure 62) will open the "Edit Sensor" dialog for that thermistor (Figure 63).

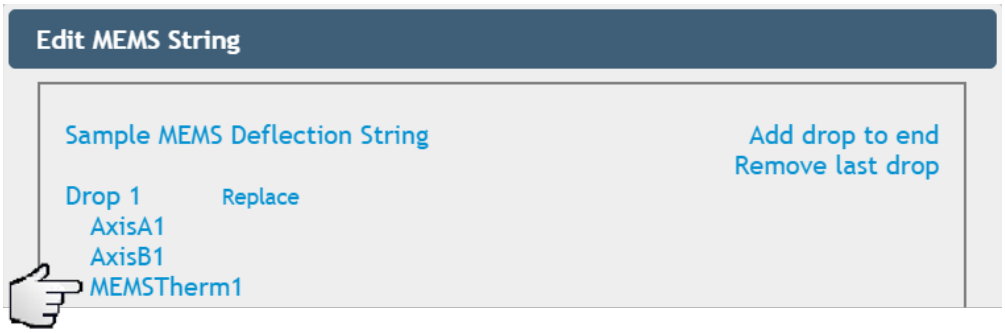

Figure 62 - Click on Thermistor Name

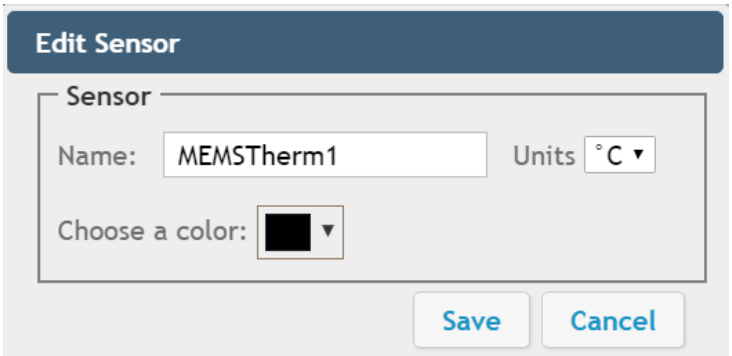

Figure 63 - Thermistor Settings

Thermistor settings are as follows:

Label	Description
Name	Enter a descriptive name for the thermistor.
Units	Determines whether the thermistor reading will be displayed in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 19 - Thermistor Settings

4.7.5.9 Replacing a Drop

Replacing a drop allows one drop to be replaced with another in the Agent program. This feature should be used when one MEMS sensor is swapped for another in the field. When a drop is replaced in the program, the following will occur:

- The "End Date" for the old drop is set to the current date.
- The old drop is detached from the string in the database, which means it can no longer be selected.
- Spacing from the old drop is transferred to the new drop.

To replace a drop, click Replace next to the drop name (Figure 64).

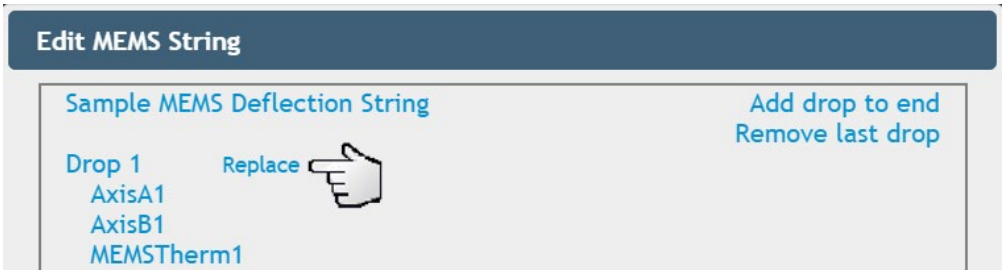

Figure 64 - Replacing a Drop

This will bring up the “Replace MEMS Drop” dialog shown in Figure 65.

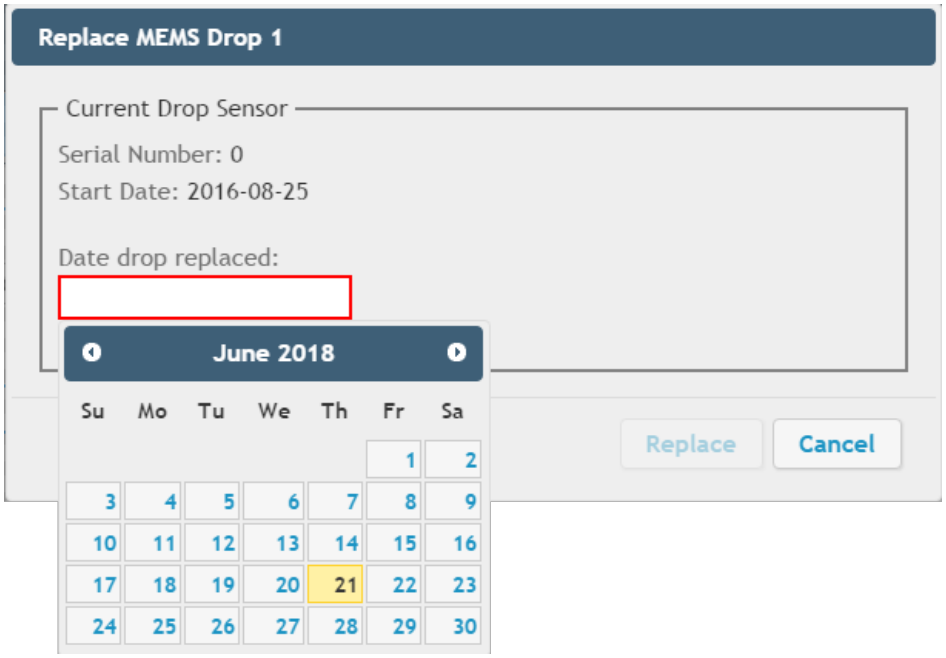

Figure 65 - Replace MEMS Drop Dialog

Choose the date the drop was replaced and then click Replace. Once the replacement date has been confirmed, the serial number and other details of the drop should be edited to match the new drop.

Clicking Cancel will close the dialog and return the settings to their previously saved configuration.

4.7.6 Two Axis Tilt meter

“Two axis tilt meter” sensors should only be used with Nodes that have a two axis MEMS tiltmeter installed inside the enclosure at the factory. (Note that the device “Type” must be set as “Tilt Two Axes”)

To add a two axis tilt meter sensor to a device, navigate to the Node Settings Screen as described in Section 4.7, then click Add 2 axis tilt meter (Figure 66).

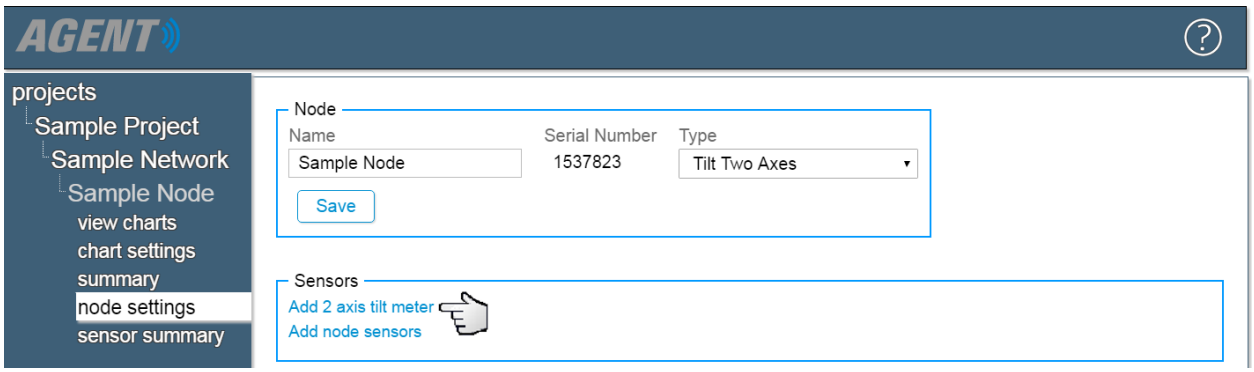

Figure 66 - Add Two Axis Tilt Meter Sensor

This will open the “Edit Tilt Meter Header” dialog (Figure 67).

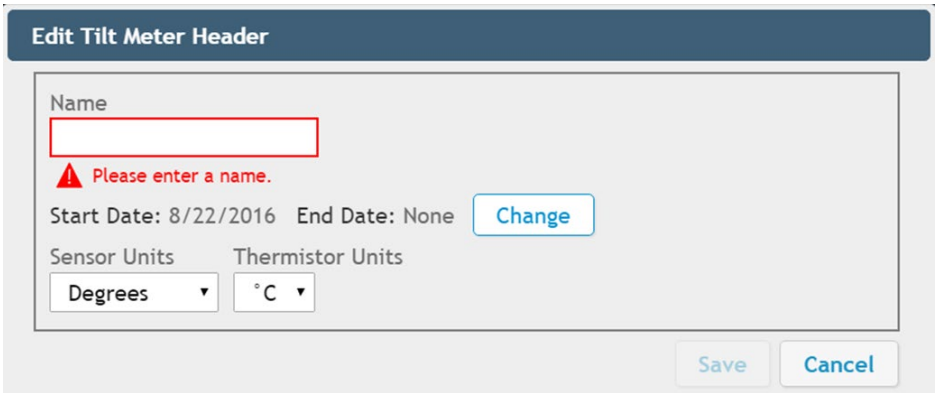

Figure 67 - Edit Tilt Meter Header

Table 20 describes the available settings.

Label	Description
Name	Enter a descriptive name for the sensor.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Sensor Units	Determines whether the reading will be displayed in Degrees, Radians, or Arcseconds.
Thermistor Units	Determines whether the thermistor reading will be displayed in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 20 - Descriptions for Two Axis Tilt Meter Sensors

Once the tilt sensor has been created, it will appear on the Node Settings Screen (Figure 68).

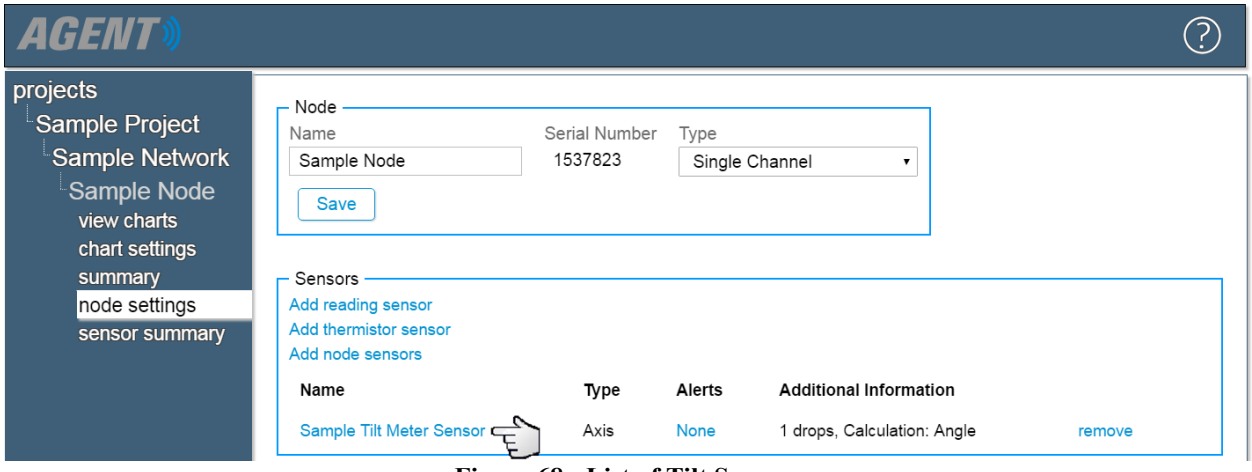

Figure 68 - List of Tilt Sensors

The “Alerts” column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To delete a sensor, click remove.

Additional settings for the two axis tilt meter sensor can be accessed by clicking on the name of the tilt sensor. This will open the “Edit Tilt Sensor” dialog (Figure 69).

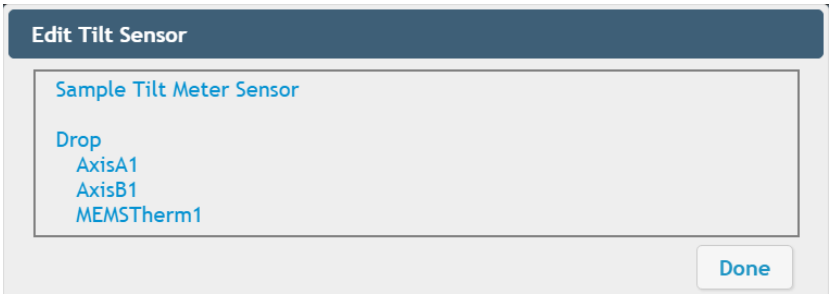

Figure 69 - Tilt Sensor Settings

The “Edit Tilt Sensor” dialog is navigated by using the tree on the left side of the screen. Clicking on any of the items in the tree will open the settings for that specific item. Refer to the sections below for more information.

4.7.6.1 Sensor Settings

Clicking on the sensor name (Figure 70) will open the “Edit Tilt Meter Header” dialog (Figure 71). This dialog is similar to the one that was used to create the sensor, however, when editing an existing sensor there are fewer settings available.

Figure 70 - Click on Sensor Name

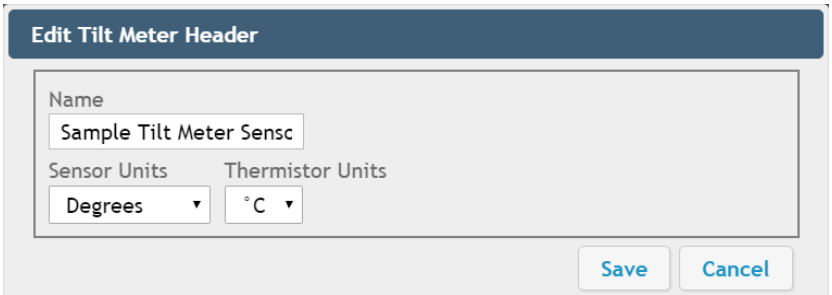

Figure 71 - Edit Tilt Meter Header

4.7.6.2 Drop Settings

Clicking on Drop (Figure 72) will open the "Edit MEMS Drop" dialog (Figure 73).

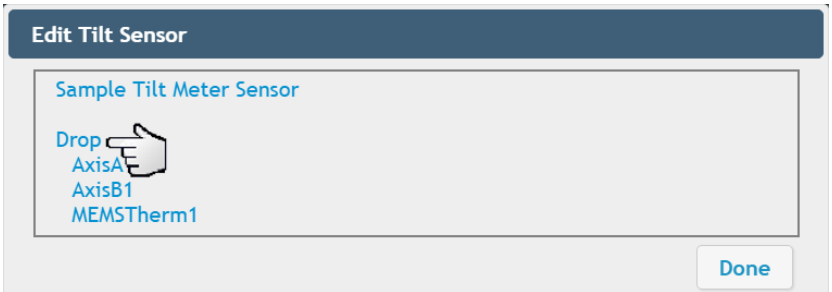

Figure 72 - Click on Drop

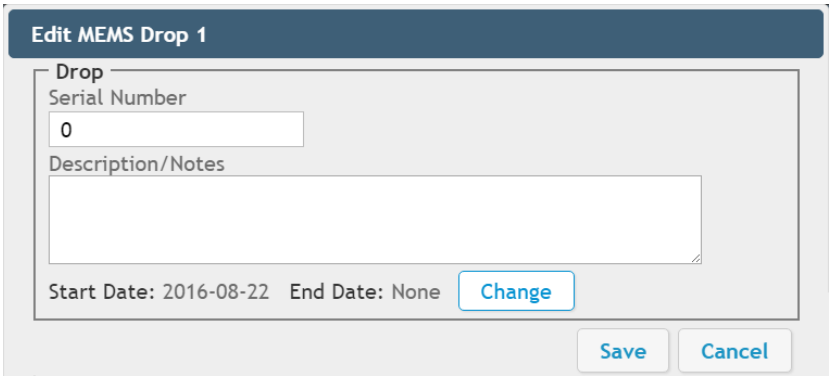

Figure 73 - Edit MEMS Drop Dialog

Drop settings are as follows described in Table 2.

Label	Description
Serial Number	Enter the serial number of the drop. (This is not required, but it is recommended to help the user differentiate drops.)
Description/Notes	Optional field for user input of any additional information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 21 - Drop Settings

4.7.6.3 Axis Settings

Clicking on the name of an axis (Figure 74) will open the "Edit Sensor" dialog for that axis (Figure 75).

Figure 74 - Click on Axis Name

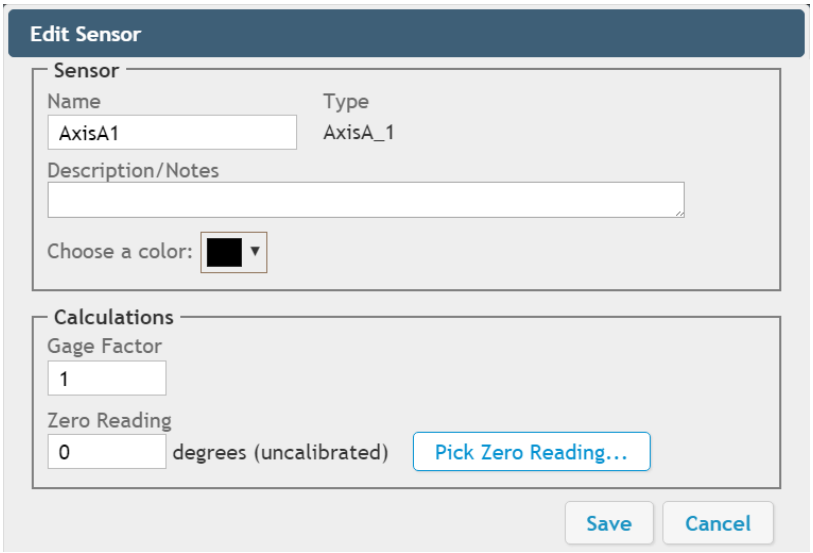

Figure 75 - Axis Settings

Axis settings are as follows:

Label	Description
Name	Enter a descriptive name for the axis.
Type	Static field showing the axis letter and drop number, e.g., AxisB_3 = the B axis of drop three.
Description/Notes	Optional field for user input of any additional information.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Gage Factor	All MEMS sensors have a gauge factor of one, nominally. Please contact GEOKON for more information.
Zero Reading	Enter the initial onsite zero reading. It is *highly recommended* that an accurate initial zero reading be obtained for each senor, as this reading will be used for all subsequent data reduction. Consult the sensor manual for more information.
Pick Zero Reading...	Opens the "Pick Zero Reading" dialog box, which allows the user to select a reading downloaded from the Network be used as the sensor's "Zero Reading".
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 22 - A or B Axis Settings

4.7.6.4 Thermistor Settings

Clicking on the name of a thermistor (Figure 76) will open the "Edit Sensor" dialog for that thermistor (Figure 77).

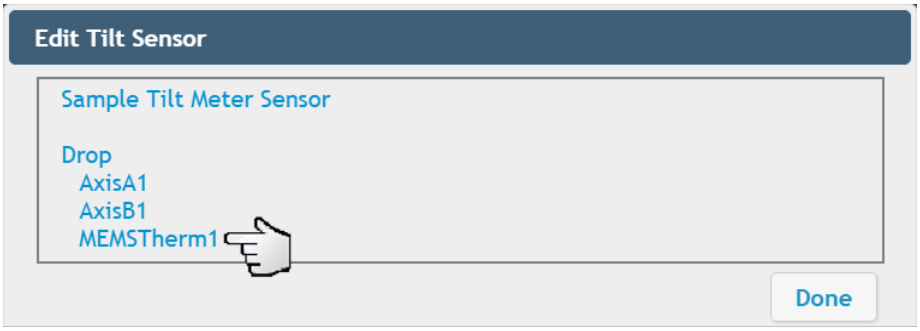

Figure 76 - Click on Thermistor Name

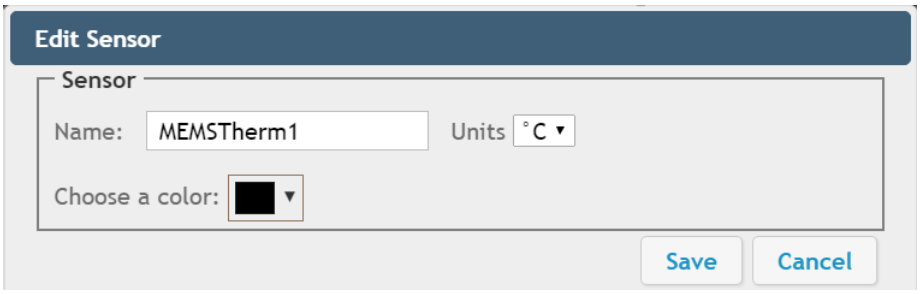

Figure 77 - Thermistor Settings

Thermistor settings are as follows:

Label	Description
Name	Enter a descriptive name for the thermistor.
Units	Select whether to display thermistor data in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 23 - Thermistor Settings

4.8 Exporting Network Data

Data export can be done manually or automatically. To export data, select a Network to be exported, and then click export (Figure 78).

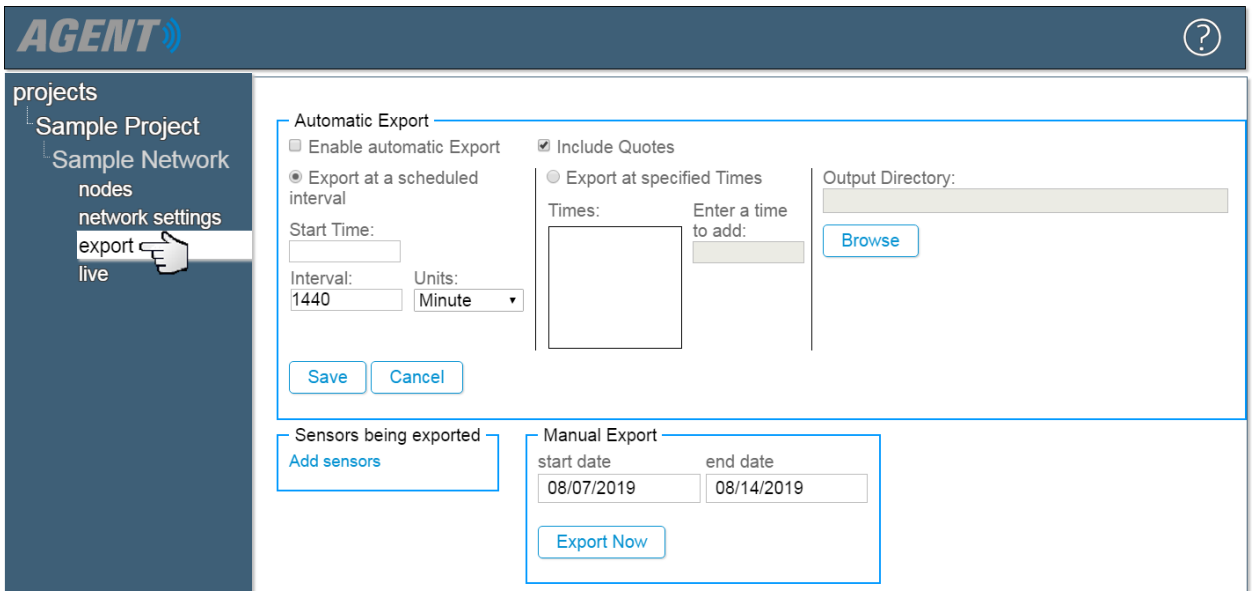

Figure 78 - Export Screen

Only data from selected sensors will be saved when export occurs. If no sensors are added, Agent will not create an export file. To add sensors to the export file, click Add Sensors (Figure 79).

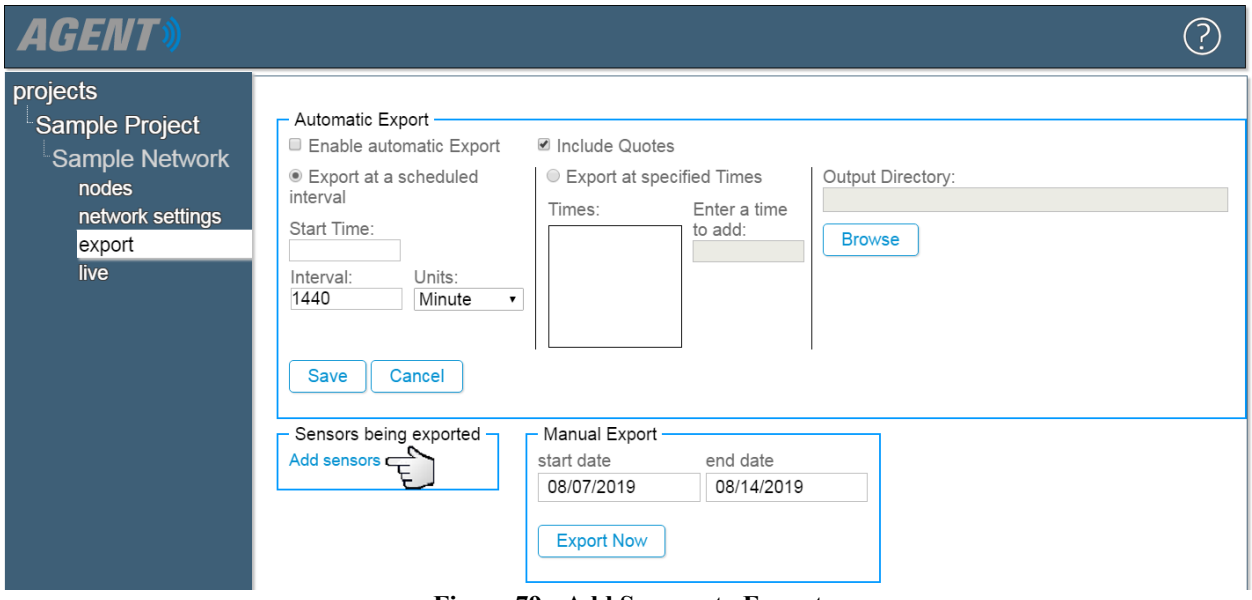

Figure 79 - Add Sensors to Export

This will open the "Add Sensors to Export" dialog box, which lists all the sensors that have been created for the Network. Select which sensors to export by clicking the check box next to the desired sensors (Figure 80).

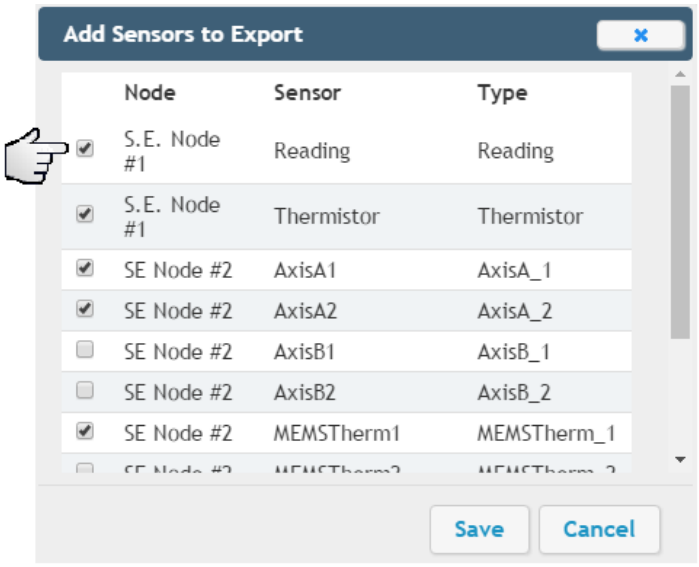

Figure 80 - Select Sensors for Export

After selecting the sensors to be exported, click Save. To close the dialog without making any changes click cancel.

Sensors that have been added will be shown in the "Sensors being exported" box (Figure 81).

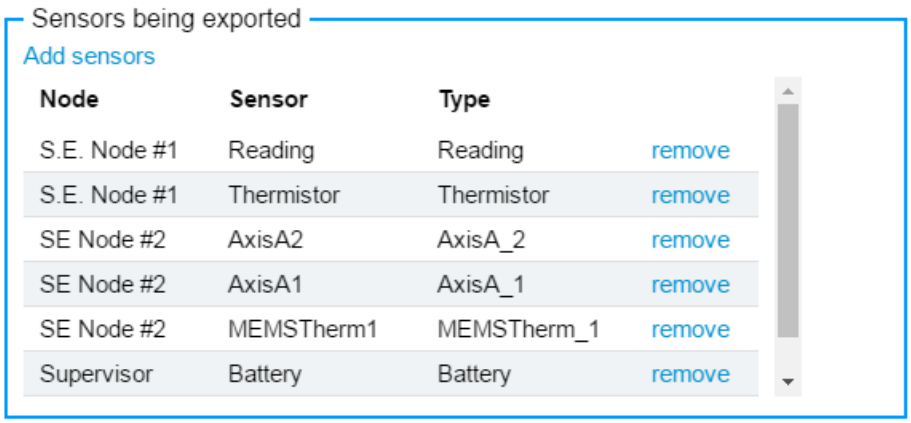

Figure 81 - Sensors Being Exported

To remove a sensor from the export list, click remove.

4.8.1 Automatic Export

Figure 82 - Automatic Export

The automatic export feature of Agent is designed to work with data management programs, e.g., Vista Data Vision®. The data file will be saved with a ".dat" extension. (Most computers prompt the user to choose a program to open this type of file.)

Data will be exported to the same file each time an export occurs. A new file will only be created after adding or removing a Node, chart, or sensor, or changing the sensor mapping. In these cases, in order to maintain the historical structure of the data, the previous file will be given the extension ".bad" and a new ".dat" file will be created.

Table 24 describes the available automatic export settings.

Label	Description
Enable Automatic Export	Check or uncheck this box to enable/disable automatic export.
Include Quotes	Contains everything between the delimiters with quotes. Regions that use alternate date formats or commas as decimal points may require this for import of the file into other programs.
Export at a scheduled interval	Select this option to have data exported at regular intervals. The first export will occur at the specified "Start time". Enter the desired start time in 24-hour format. (For example, 3:30 PM becomes 15:30.) Data download will recur based on the information entered in the "Interval" and "Units" fields.
Export at specified Times	Select this option to set specific times of the day for the data to be exported. Enter a time in 24-hour format (for example 3:30 PM becomes 15:30) in the "Enter a time to add" field and then click the ⊕ icon to add it to the list of download "Times". To remove a download time from the list, click the ⊖ icon next to the time to be removed.
Output Directory	Determines how the file will be saved. To set the Output Directory, click browse.
Save	Applies the current settings to the Network.
cancel	Returns settings to their previously saved configurations.

Table 24 - Automatic Download Settings

4.8.2 Manual Export

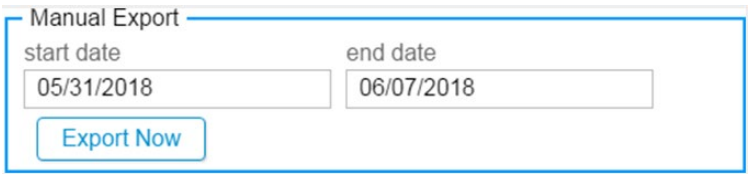

Figure 83 - Manual Export

Manual export is a onetime download of data for the specified date range. The completed file displays sensor data in columns (the order of which is based on the "Sensors being exported" list). The header of each column shows the serial number of the Node or Supervisor the sensor is associated with, followed by the sensor type.

Click Export Now to begin the export. Once the data has been exported, Agent will prompt the user to choose a location for the file. Choose the desired directory and then click save. The exported data file will be saved with a ".csv" extension.

5. LC2 DATALOGGERS

It is assumed that all relevant LC2 hardware has already been installed, the LC2 has been connected to the computer, and all device drivers have been installed correctly. For information regarding installation of LC2 dataloggers, please consult the appropriate LC2 instruction manual. (Relevant instruction manuals can be accessed inside the Agent program by clicking the ? icon in the top right corner of the screen.)

5.1 Adding an LC2 Datalogger

To add an LC2 datalogger to a Project, select a Project (Figure 84) and then click add lc2 on the left side of the screen (Figure 85).

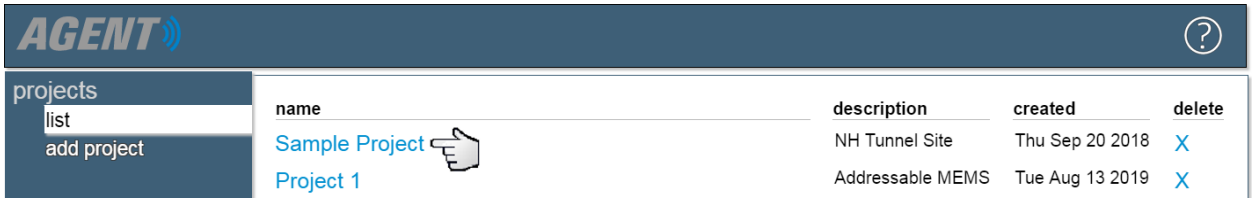

Figure 84 - Selecting a Project

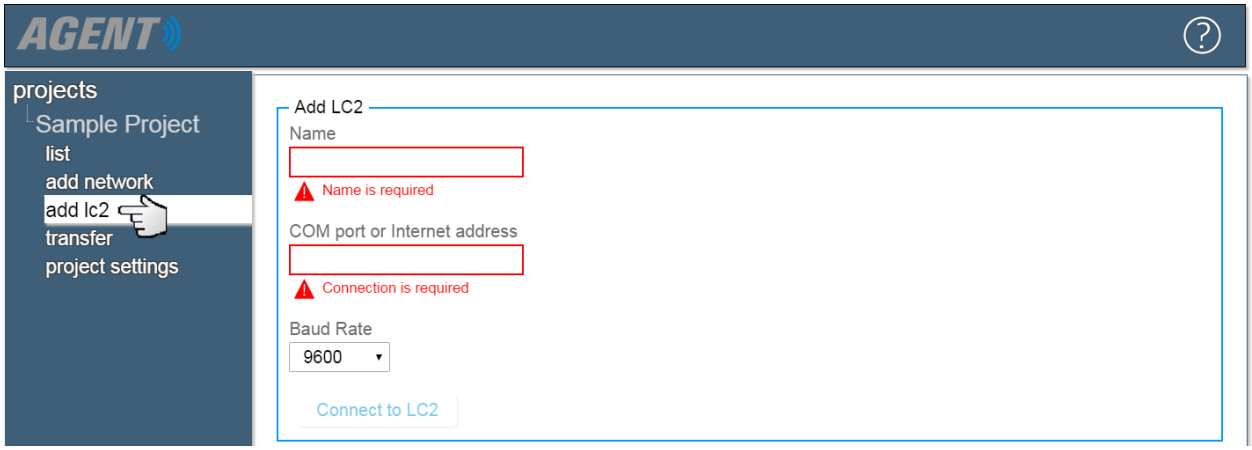

Figure 85 - Add LC2 Screen

Enter a descriptive name for the LC2 datalogger.

For LC2 dataloggers that have been connected to the PC using a USB or RS-232 cable, continue to Section 5.1.1. For dataloggers connected through a Networked device such as a serial server or cellular modem, see Section 5.1.2.

5.1.1 Connections Using a USB or RS232 Cable

Type “COM” into the “COM port or internet address” field to display a list of available COM ports. Choose the correct port from the list (Figure 86) or type in the full name of the desired COM port.

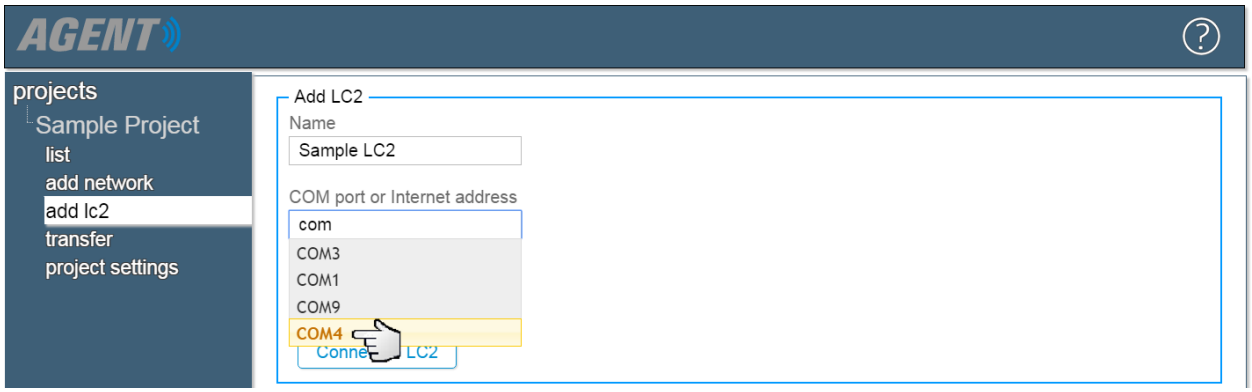

Figure 86 - Entering COM port

If the correct COM port does not display in Agent, close the program, make sure the LC2 is powered on and the cable connection is secure, and then try again. If unsure of which COM port the LC2 is utilizing, refer to the information in Appendix A.

LC2 dataloggers can communicate at baud rates of 9600 and 115,200. Select the correct baud rate for the LC2 being connected. (A baud rate of 9600 is required for single channel LC2 dataloggers with firmware prior to version 5.2.X and for multichannel LC2 dataloggers with firmware prior to version 3.1.X.)

Once the name, COM port, and baud rate have been entered, click Connect to LC2. Agent will attempt to connect to the LC2. Once a connection has been established, Agent will navigate to the “General” LC2 Settings Screen (see Section 5.4.1). If the LC2 was previously used with Agent or LogView Software, the user will be given the chance to recover data before Agent connects to the datalogger. Refer to Section 5.1.3 for dataloggers previously connected to Agent, and to Section 5.1.4 for those previously connected to LogView.

If Agent fails to establish a connection an error message will appear, and the reason for the failure will be given if it is available. Should this occur, make sure the COM port is correct, the LC2 is powered on, and the cable connection is secure; then try again.

5.1.2 Wireless Connections via an Exterior (add on) Networked Device

Enter the device URL or IP address into the “COM port or internet address” field (Figure 87). An IP address must contain a colon after the address, followed by the port, e.g., 10.1.7.91:5555.

NOTE: When connecting with a serial server or cellular modem it may be necessary for the Network administrator to set the IP address for local Networks. Cellular modems will usually have a static IP address designated by the carrier.

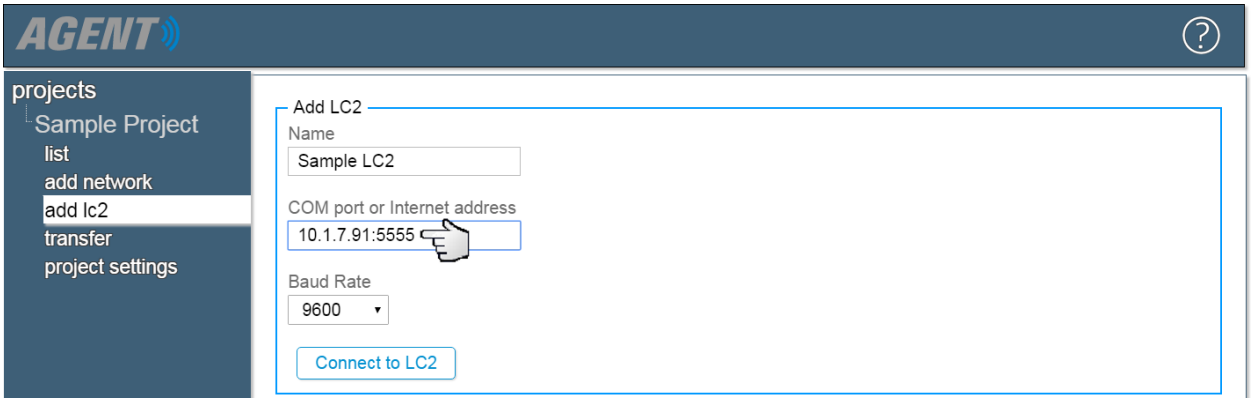

Figure 87 - Enter Internet Address

LC2 dataloggers can communicate at baud rates of 9600 and 115,200. Select the correct baud rate for the LC2 being connected. (A baud rate of 9600 is required for single channel LC2 dataloggers with firmware prior to version 5.2.X and for multichannel LC2 dataloggers with firmware prior to version 3.1.X.)

Once the name, internet address, and baud rate have been entered, click Connect to LC2. Agent will attempt to connect to the LC2. Once a connection has been established, Agent will navigate to the "General" LC2 Settings Screen (see Section 5.4.1). If the LC2 was previously used with Agent or LogView Software, the user will be given the chance to recover data before Agent connects to the datalogger. Refer to Section 5.1.3 for dataloggers previously connected to Agent, and to Section 5.1.4 for those previously connected to LogView.

If Agent fails to establish a connection an error message will appear, and the reason for the failure will be given if it is available.

5.1.3 Adding LC2 Dataloggers Previously Connected to Agent

If an LC2 datalogger was previously used with Agent software, but is not currently in the Agent database (e.g., it was deleted from Agent, it was connected to a different computer, etc.) when Agent attempts to connect to the LC2, the dialog shown in Figure 88 will be displayed.

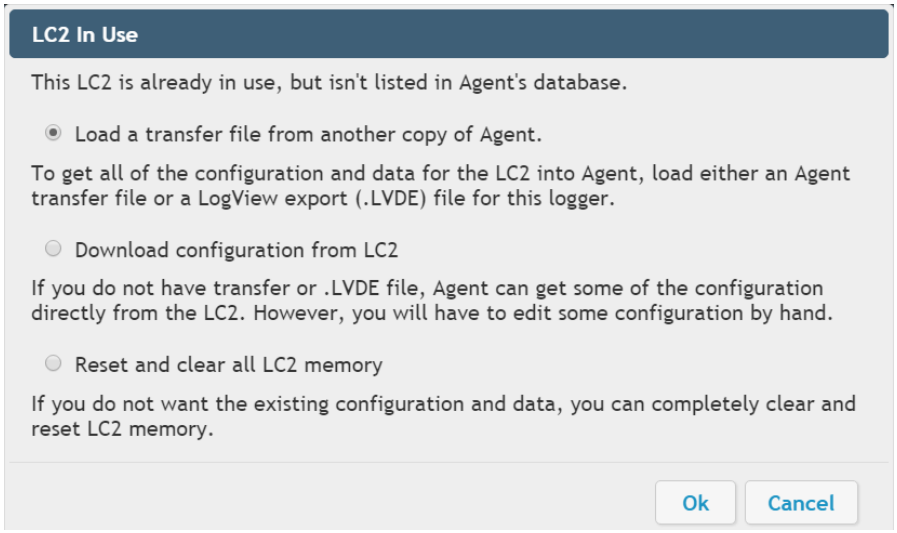

Figure 88 - Agent Connection Exception

Option 1: If "Load a transfer file from another copy of Agent" is selected, Agent will prompt the user to select a transfer file to load. The transfer file used should be from the Agent database the LC2 was previously saved in. See Section 8 for information on creating transfer files in Agent.

Option 2: If for some reason an Agent transfer file or LogView .LVDE file cannot be created, select "Download configuration from LC2". Agent will import all LC2 settings that are attainable directly from the datalogger.

Option 3: If you do not wish to import any of the settings or data from the LC2, select "Reset and clear all LC2 memory". **Use with caution. This is the equivalent of a factory reset. All stored data and settings will be erased from the LC2.**

5.1.4 Adding LC2 Dataloggers Previously Connected to LogView Software

If an LC2 datalogger was previously used with LogView Software, then when Agent attempts to connect to the LC2, the dialog shown in Figure 89 will be displayed.

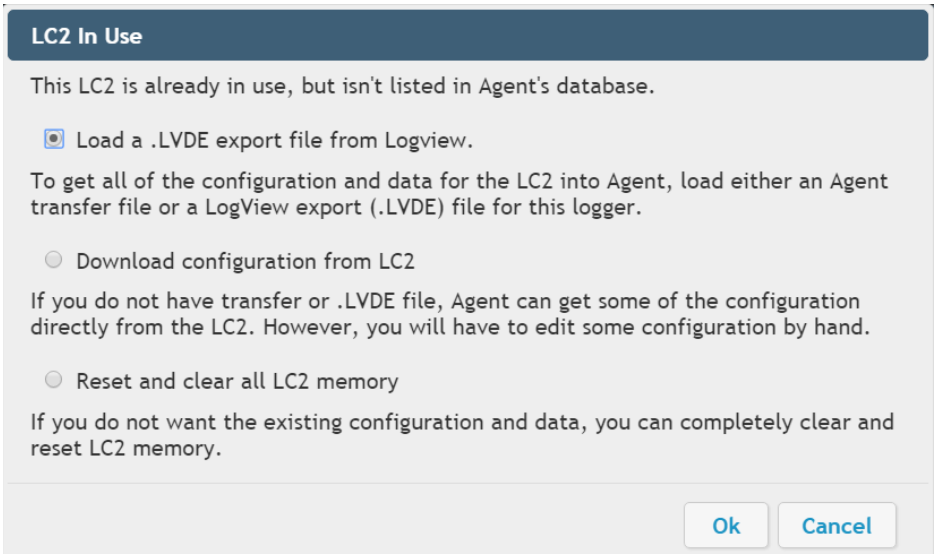

Figure 89 - LogView Connection Exception

Option 1: If "Load a .LVDE export file from LogView" is selected, Agent will load all settings and data from the logger via an export file created in LogView (file extension .LVDE).

To create an export file in LogView, right click on the datalogger to create a "Logger to .LVDE file" (Figure 90). After exporting the file, return to Agent to continue creating the LC2.

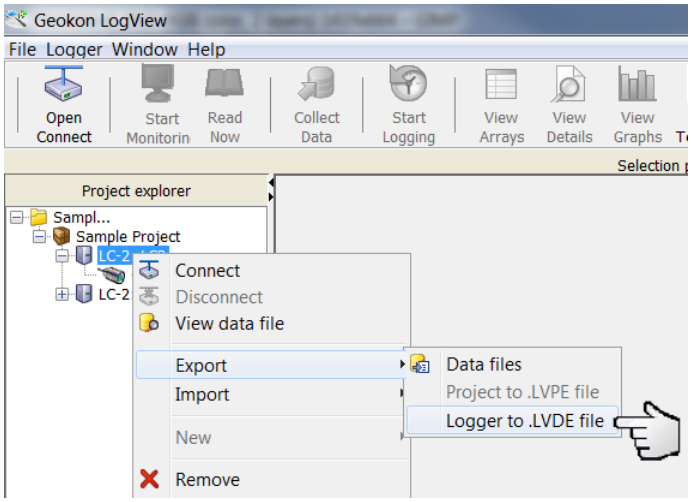

Figure 90 - Create .LVDE File in LogView

Option 2: If for some reason a LogView .LVDE file cannot be created, select "Download configuration from LC2". Agent will import all LC2 settings that are attainable directly from the datalogger.

Option 3: If you do not wish to import any of the settings or data from the LC2, select "Reset and clear all LC2 memory". **Use with caution. This is the equivalent of a factory reset. All stored data and settings will be erased from the LC2.**

5.2 List of LC2 Dataloggers Associated with a Project

Once Agent has successfully connected to an LC2, it will be added to the Project.

To view the LC2 dataloggers associated with a Project, click projects on the left side of the screen, then click on the name of the desired Project (Figure 91). This will open the "List" screen (Figure 92).

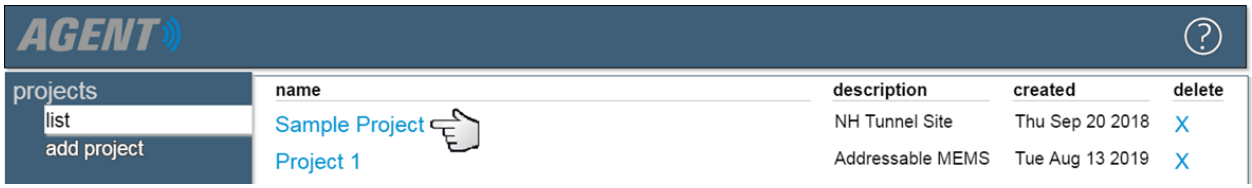

Figure 91 - Select a Project

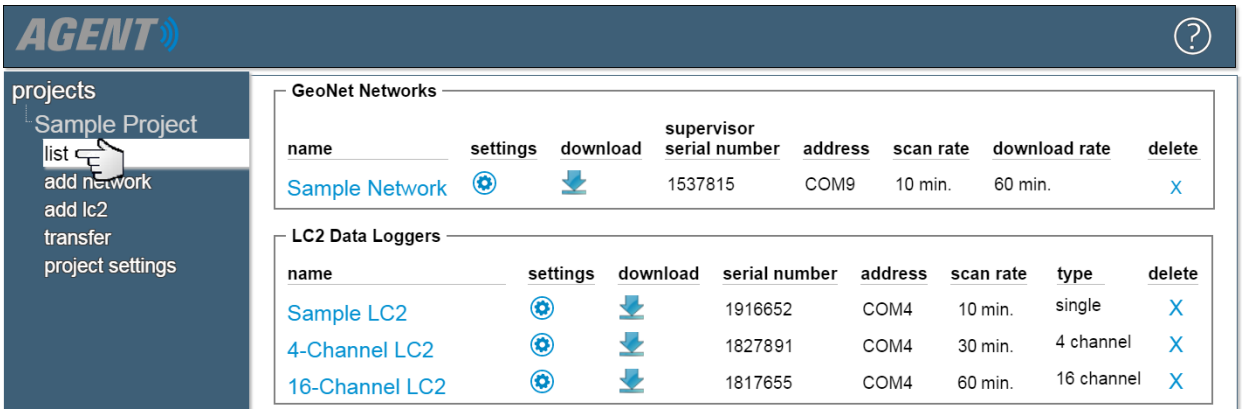

Figure 92 - The List Screen

For more information about the LC2 Dataloggers portion of the list screen, refer to Table 25 below.

Column Heading	Description
Name	Clicking on the name of an LC2 will open the LC2 menu for that datalogger. See Section 5.3 for more information.
Settings	Click the icon to open the LC2 Settings screen. See Section 5.4.
Download	Click the icon to navigate to the download screen. See Section 5.5 for more information on downloading.
Serial Number	Static field showing the serial number of the LC2.
Address	The method of connection used for the LC2. (COM port, URL, or IP address with port number). See Section 5.1.
Scan Rate	Determines how often the LC2 takes sensor readings. It may be necessary to temporarily turn off automatic download to change the scan rate of the network. (Should be left at 10 minutes until it has been verified that all LC2 dataloggers are present and collecting data.) See Section 5.4.3.
Type	Static field displaying the type of LC2 connected, i.e., how many channels it has.
Delete	Click the X icon to delete the corresponding LC2. **WARNING!** Deleting an LC2 will erase **ALL** data associated with the datalogger. It is highly recommended that an Agent Transfer file be created before deleting the LC2.

Table 25 - Descriptions for the LC2 List

5.3 LC2 Menu

To view the data, settings, charts, etc., for an LC2 datalogger, select a Project, then click on the name of the desired LC2 datalogger (Figure 93).

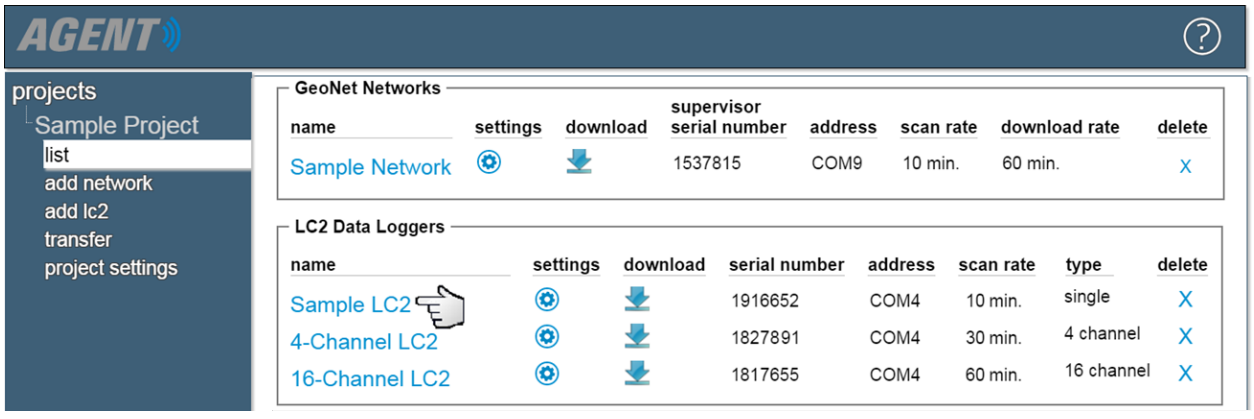

Figure 93 - Select an LC2 Datalogger

Agent will navigate to the “View Charts Screen”. The main menu for the LC2 will be displayed on the left side of the screen (Figure 94).

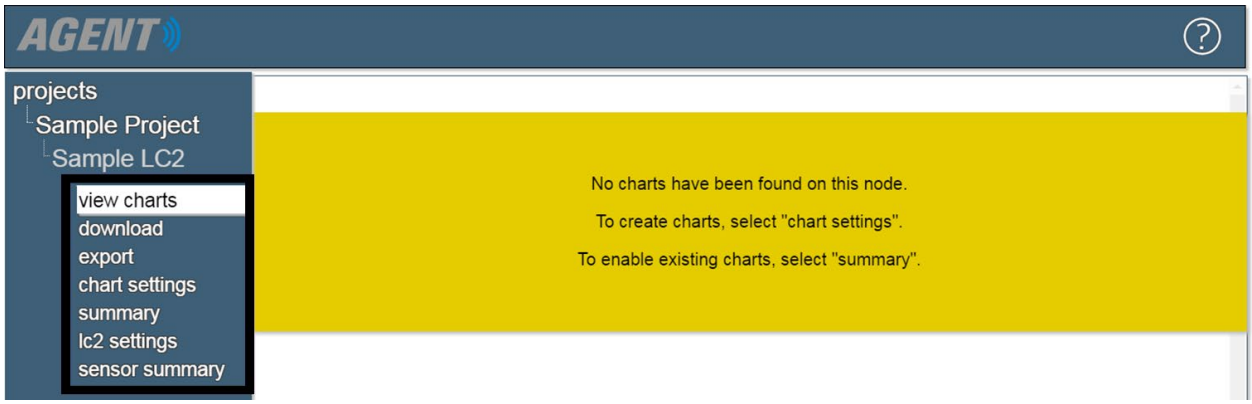

Figure 94 - LC2 Menu (Left Side of the Screen)

The LC2 main menu items are covered by the following sections:
View Charts: View all charts associated with the LC2. See Section 6 for information on working with Charts.
Download: Download data from the LC2. Section 5.5
Export: Export data to a file. Section 5.6
Chart Settings: Controls which charts will be displayed on the View Charts Screen as well as in Live Charts See Section 6 for information on working with Charts.
Summary: Open the Chart Summary Screen. See Section 6 for information on working with Charts.
Settings: Click to open the LC2 Settings Menu, see Section 5.4

5.4 LC2 Settings Menu

To edit the settings of an LC2, select the Project that contains the LC2 and then click the icon that corresponds to the LC2 to be edited (Figure 95). (The settings can also be accessed by clicking on the name of the LC2 and then clicking lc2 settings on the left side of the screen.)

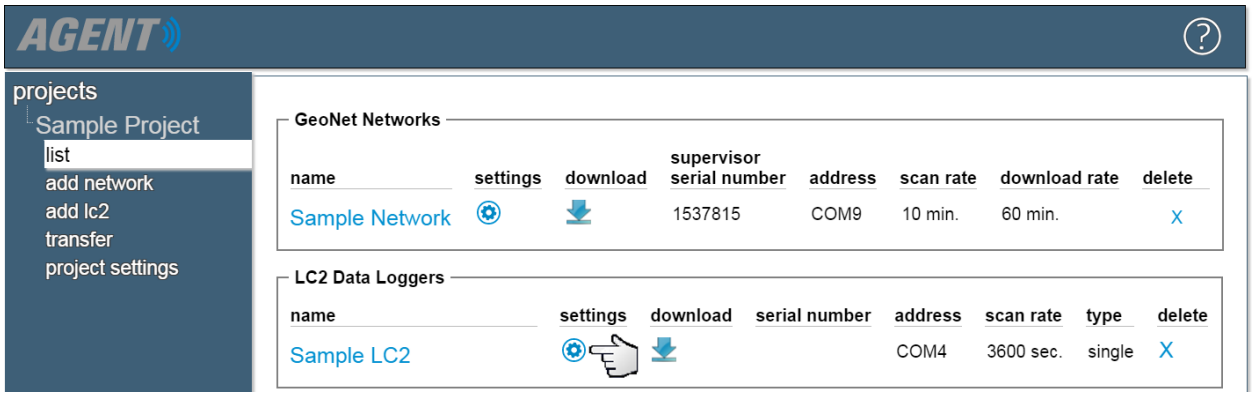

Figure 95 - Select an LC2 Datalogger

Agent will navigate to the “General” LC2 Settings. The settings menu for the LC2 will be displayed on the left side of the screen (Figure 96).

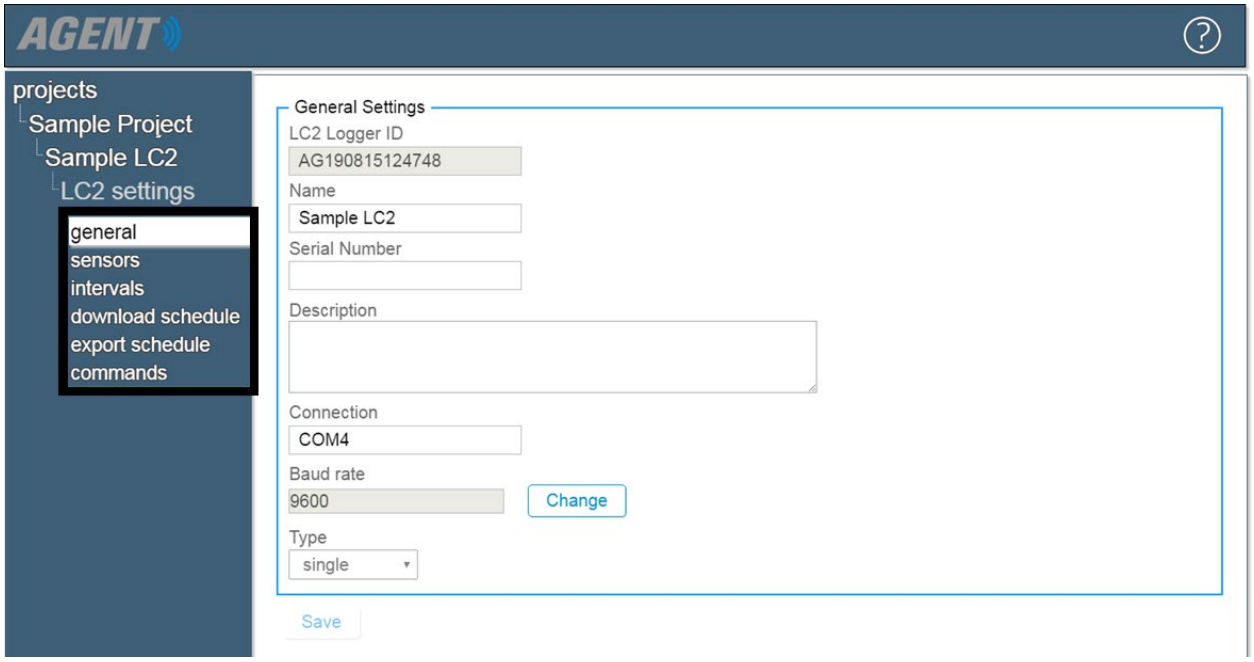

Figure 96 - LC2 Settings Menu (Left Side of the Screen)

The LC2 settings menu is covered by the subsections that follow.

5.4.1 General

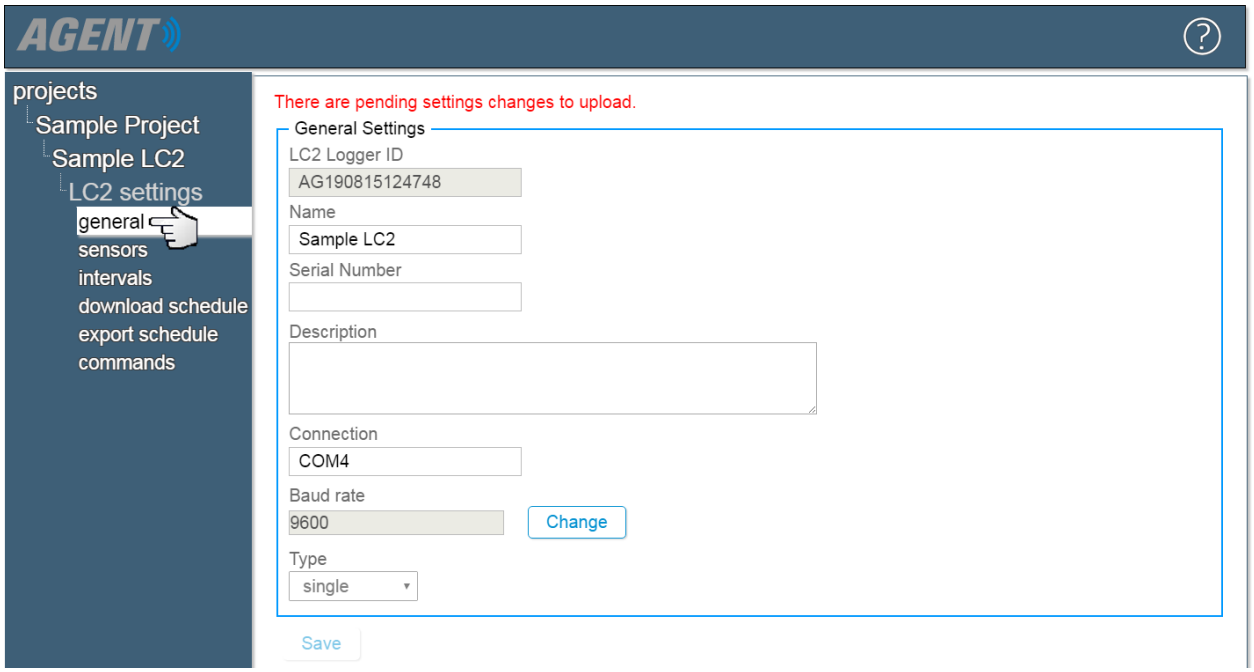

Figure 97 - General LC2 Settings

Table 26 describes the available “General” settings.

Label	Description
LC2 Logger ID	Static field displaying the Logger ID assigned to the LC2 by Agent. The Logger ID is used by the Agent program to differentiate LC2 dataloggers.
Name	Enter a descriptive name for the LC2.
Serial number	Enter the serial number of the LC2. (This is not required, but it is recommended to help the user differentiate LC2 dataloggers.)
Description	Optional field for user input of any additional information.
Connection	The method of connection used for the LC2. Enter a COM port, URL, or IP address with port number. See Section 5.1.
Baud Rate	LC2 dataloggers can communicate at baud rates of 9600 and 115,200. To change the current setting click Change. (A baud rate of 9600 is required for single channel LC2 dataloggers with firmware prior to version 5.2.X and for multichannel LC2 dataloggers with firmware prior to version 3.1.X.)
Type	Static field displaying the type of LC2, i.e., how many channels it has.
There are pending setting changes to upload to the logger.	Appears when changes have been saved in the “Sensors” Screen (Section 5.4.2) or “Intervals” Screen (Section 5.4.3) but have not yet been uploaded to the LC2. (See Section 5.4.6 for information on uploading.)

Table 26 - LC2 General Settings Label Descriptions

5.4.2 Sensors

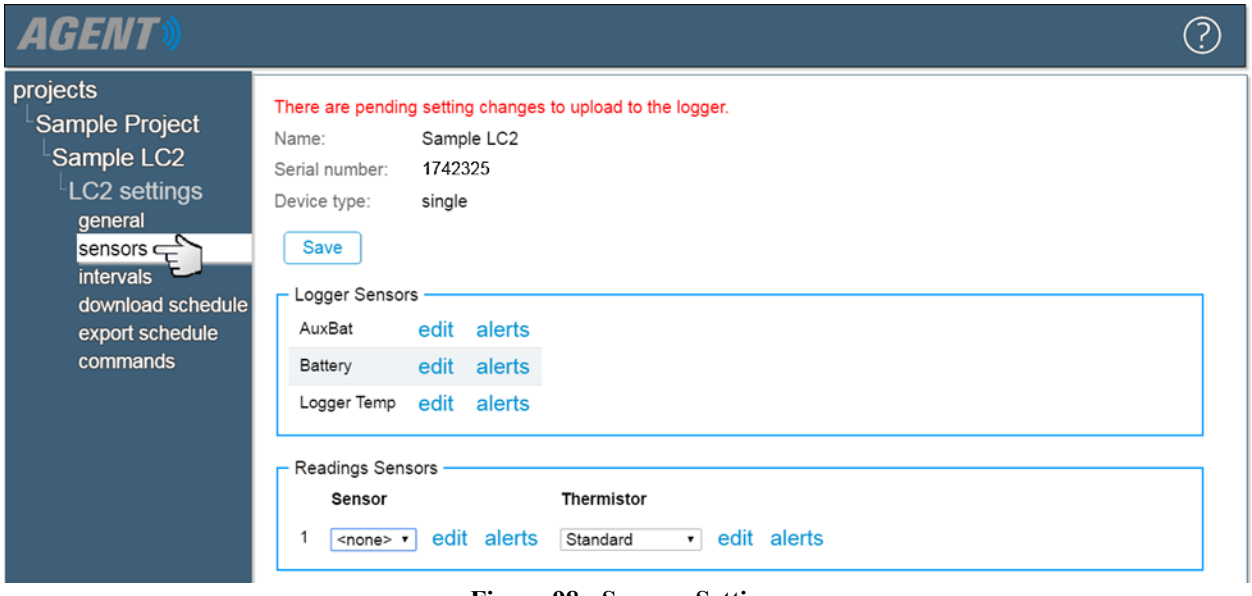

Figure 98 - Sensors Settings

Sensors collect data; this data is then displayed as a line on a chart. (For more information on Charts, see Section 6.) The Sensors settings screen allows the user to edit the sensors associated with an LC2 as well as create alerts that will be displayed on a chart when data criteria set by the user is exceeded. The different sections of the screen are covered in the subsections below.

NOTE: Any changes that are saved on this screen must be uploaded to the LC2 for them to take effect. If changes have been made, but they have not yet been uploaded to the datalogger, the message "There are pending setting changes to upload to the logger." will appear at the top of the screen. For information on uploading settings to the LC2 see Section 5.4.6.

5.4.2.1 Name / Serial Number / Device Type

NAME / SERIAL NUMBER: Static fields showing the name and serial number of the LC2. To change the name or serial number, click general on the left side of the screen to navigate to the general LC2 settings.

DEVICE TYPE: Static field displaying the type of LC2, i.e., how many channels it has.

5.4.2.2 Logger Sensors

The "Logger Sensors" portion of the screen (Figure 99) shows the factory installed sensors contained within the LC2.

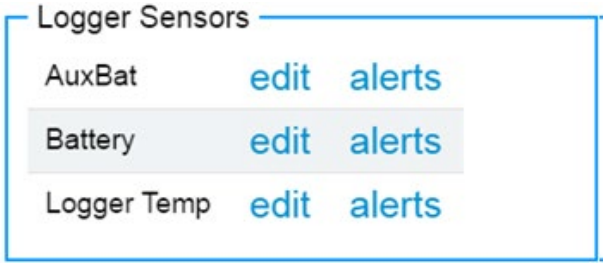

Figure 99 - LC2 Sensors

"Alerts" can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

To edit an LC2 sensor, click edit. This will open the Edit Sensor dialog for that sensor (Figure 100). For information on the available settings, see Table 27 below.

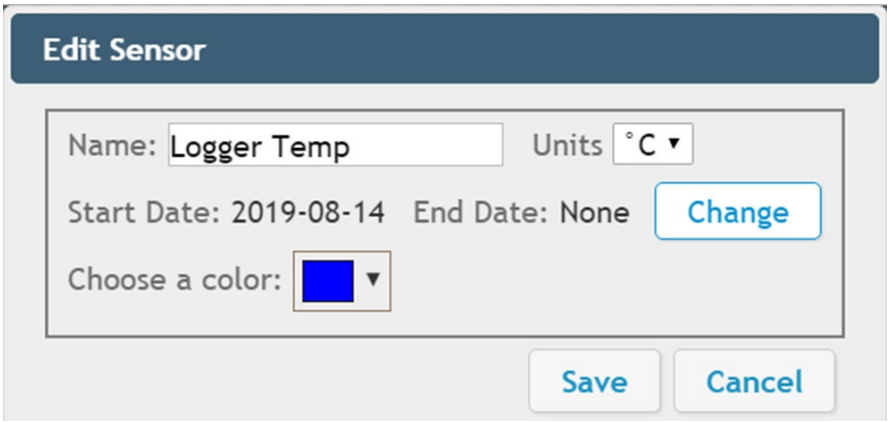

Figure 100 - Edit LC2 Sensor Dialog

Label	Description
Name	Enter a descriptive name for the sensor.
Units	Only available for Logger Temp sensors. Determines whether the temperature will be displayed in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 27 - Descriptions for the Edit LC2 Sensor Dialog

5.4.2.3 Readings Sensors

The "Readings Sensors" portion of the screen (Figure 101) shows the external sensors attached to the LC2 by the user, e.g., piezometers, strain gauges, etc. Each row represents a channel on the LC2, e.g., if it is a four-channel LC2, there will be four rows displayed with the numbers one through four representing the corresponding channel on the LC2.

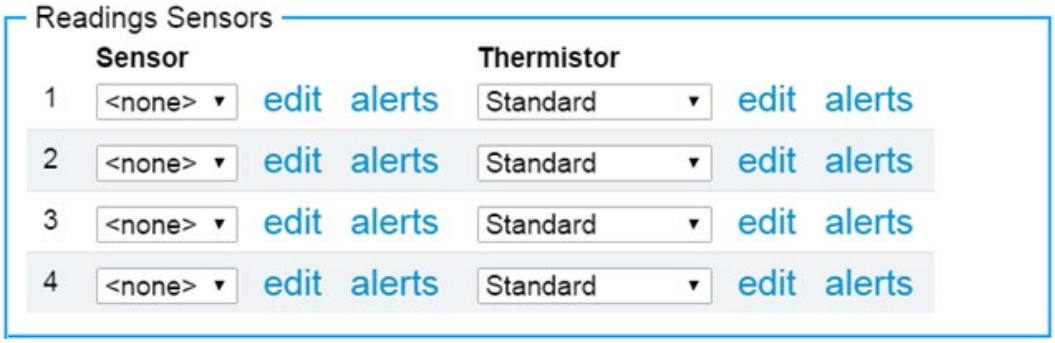

Figure 101 - Readings Sensors

Use the drop-down box in the “Sensor” column to select the model series of the gauge attached to that channel of the LC2. Use the drop-down box under “Thermistor” to select the type of thermistor installed in the gauge.

To edit a Sensor or Thermistor, click edit. See Figure 102 and Figure 103 and the accompanying tables for information on editing Sensors and Thermistors.

The “Alerts” column can be used to create alerts that will be displayed on the View Charts and Live Charts screens when user defined criteria are exceeded. For information on alerts, see Section 7.

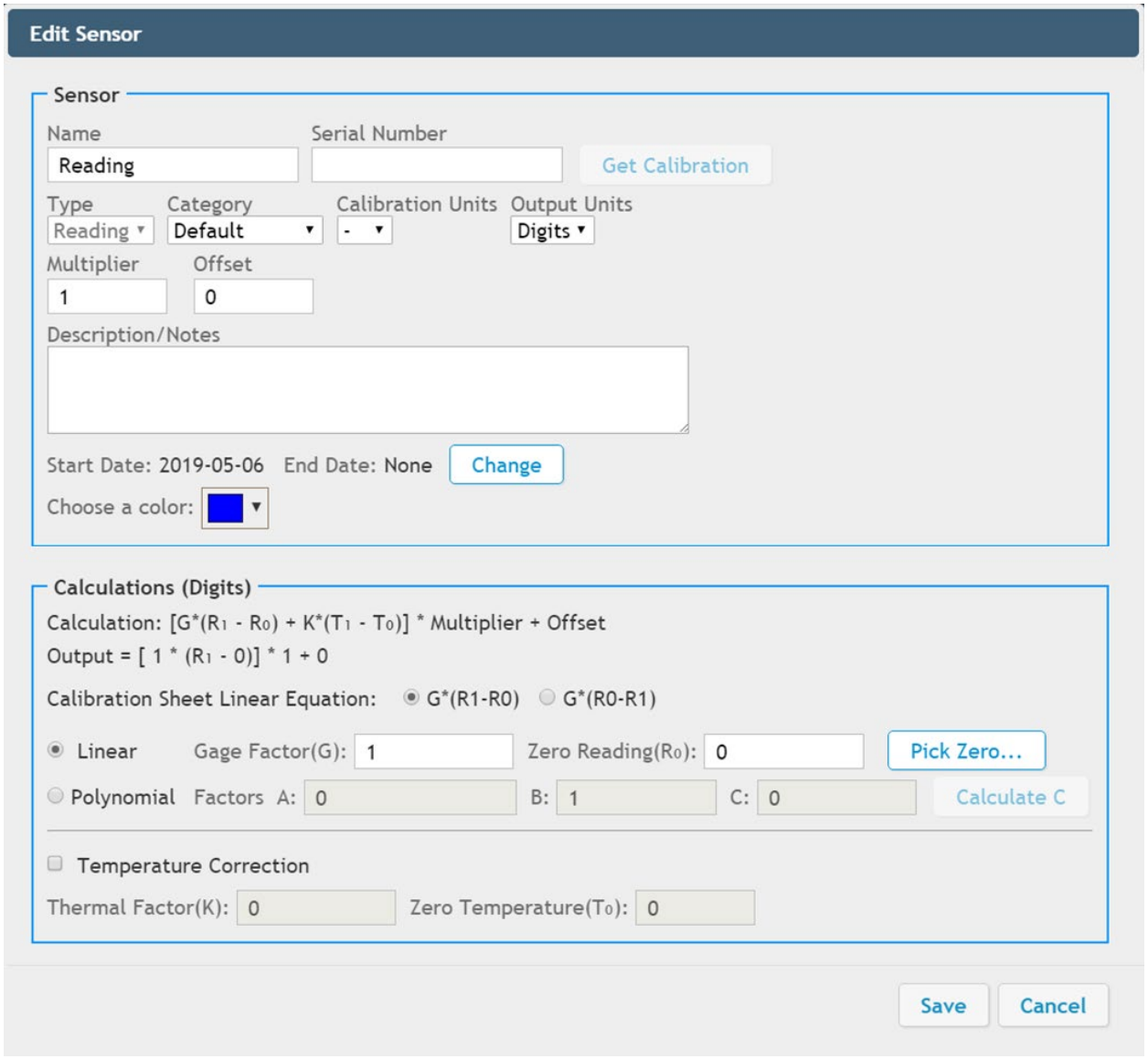

Figure 102 - Edit Sensor Dialog

Label	Description
Name	Enter a descriptive name for the sensor.
Serial Number	The serial number of the gauge connected to the LC2. (This is not required, but it is recommended to help the user differentiate gauges.)
Get Calibration	Retrieves calibration data from GEOKON's database and populates the Linear Gage Factor (G), as well as the Polynomial gage factors A, B, and C. (Currently, calibration data is only available for piezometers and displacement transducers manufactured after Dec. 2016, MEMS sensors manufactured after Nov. 2017 and load cells manufactured after April 2018.)
Type	Static field showing which channel of the LC2 the sensor is associated with. For example, if the Type is "Reading 2", then the sensor being edited is on channel two of the LC2.
Category	Choose the category that coincides with the type of gauge connected. Refer to the manual that was supplied with the gauge if unsure.
Calibration Units	Available Calibration Units will vary based on what category has been chosen. The selected units should match the units of the gauge factor on the calibration report provided with the gauge.
Output Units	Determines the type of engineering units the data will be displayed in.
Multiplier	Applied to the linear or polynomial calculation. Can be used to convert units. If the selected "output units" differ from the "calibration units", Agent will automatically calculate the multiplier to convert the units.
Offset	"Offset" is an optional constant that can be added to the sensor output to adjust the data. For example: If a piezometer installed at a site elevation of -40 feet is reading +2 feet of water, entering an offset of -40 would adjust the reading to -38 feet, the actual water elevation of the sensor.
Description/Notes	Optional field for user input of any additional information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Calculation:	Shows the equation that will be used to calculate the sensor output.
Output =	The output equation is the "Calculation:" equation with user entered integers applied. The output equation will change automatically to reflect the information entered in the dialog.
Calibration Sheet Linear Equation:	Select the option that matches the equation shown on the calibration sheet provided with the sensor. [As a general rule, G*(R1-R0) is used for sensors manufactured after June of 2012.]
Linear	Select to utilize the linear calibration equation.

Gage Factor(G)	The default gauge factor of one, can be used to output the data in digits. To output the data in other engineering units, the gauge factors found on the GEOKON Calibration Report provided with the vibrating wire sensor must be entered.
Zero Reading(R_0)	Enter the initial onsite zero reading. It is *highly recommended* that an accurate initial zero reading be obtained for each senor, as this reading will be used for all subsequent data reduction. However, the factory zero reading on the calibration report may be sufficient if no onsite zero reading exists. Consult the sensor manual for more information.
Pick Zero...	Opens the "Pick Zero Reading" dialog box, which allows the user to select a reading downloaded from the LC2 be used as the sensor's "Zero Reading".
Polynomial	Select to utilize the polynomial calibration equation.
Factor A	Required for output in engineering units. Found on the GEOKON Calibration Report provided with the gauge.
Factor B	Required for output in engineering units. Found on the GEOKON Calibration Report provided with the gauge.
Factor C	Value will be displayed after clicking "Calculate C".
Calculate C	Calculates the value of Factor C from a user entered zero reading.
Temperature Correction	If maximum accuracy is desired, or if ambient temperature changes are large, a temperature correction can be applied. Checking this box will include the values entered in the "Thermal Factor" and "Zero Temperature" fields in the output equation.
Thermal Factor(K)	Enter the Thermal Factor from the calibration report.
Zero Temperature(T_0)	If using an onsite zero reading, enter the temperature at which the onsite zero reading was taken in degrees Celsius. If using the factory zero reading, enter the temperature listed on the bottom of the GEOKON Calibration Report.
Save	Saves the current settings.
Cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 28 - Descriptions for the Edit Sensor Dialog

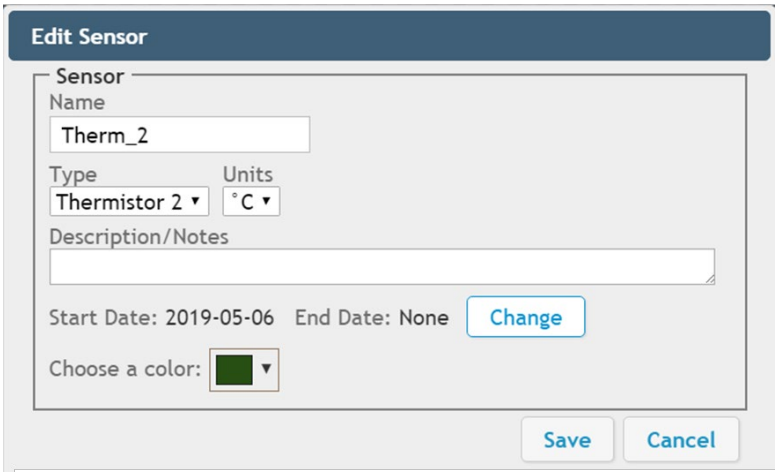

Figure 103 - Edit Sensor Dialog for Thermistors

Label	Description
Name	Enter a descriptive name for the thermistor.
Type	Static field showing which channel of the LC2 the thermistor is associated with. For example, in Figure 103 the Type shows “Thermistor 2” meaning that the thermistor being edited is on channel two of the LC2.
Units	Determines whether the temperature will be displayed in degrees **C**elsius, **K**elvin, or **F**ahrenheit.
Description/Notes	Optional field for user input of any additional information.
Start/End Date	Determines the date range of the data displayed on a chart. The first-time data is downloaded from the LC2, Agent will automatically set the start date to the date of the first reading taken by the sensor. The end date is normally left blank unless the sensor is removed. Normally the user will not need to edit these values. To change the start/end date click Change.
Choose a Color	Determines what color the line representing the sensor will be on the completed chart. Click on the current color to open the color palette. Select a standard color from the left side of the menu or use the color palette on the right to create a custom color and then click choose.
Save	Saves the current settings.
cancel	Closes the dialog and returns settings to their previously saved configuration.

Table 29 - Descriptions for the Edit Thermistor Dialog

5.4.3 Intervals

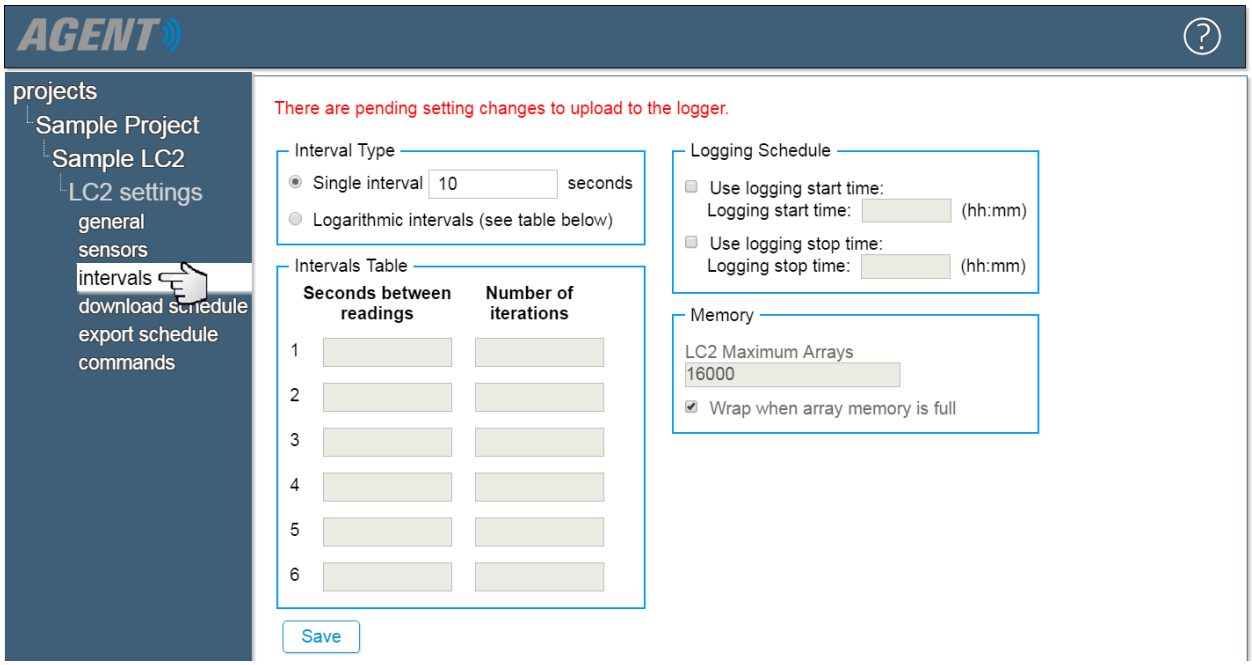

Figure 104 - Intervals Settings

The Intervals Screen (Figure 104) is used to define the interval between readings taken by the LC2 datalogger. The different sections of the screen are covered in the subsections below.

NOTE: Any changes that are saved on this screen must be uploaded to the LC2 for them to take effect. If changes have been made, but they have not yet been uploaded to the datalogger, the message "There are pending setting changes to upload to the logger." will appear at the top of the screen. For information on uploading settings to the LC2 see Section 5.4.6.

5.4.3.1 Interval Type and Intervals Table

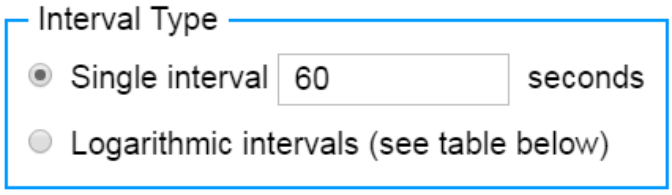

Figure 105 - Single Interval

Determines whether a single or logarithmic interval will be used to schedule readings.

When using "Single interval", enter the desired interval between readings in seconds. If the value of "seconds" divides evenly into a time, then readings will be synchronized to real-time. For example, entering an interval of 3600 seconds will cause the readings to occur on the hour, every hour. (This is not the case when a start time has been set in the "Logging Schedule". See Section 5.4.3.2 below for more information.)

When using "Logarithmic intervals", the Intervals table (Figure 106) is used to schedule readings. Interval lengths are specified in seconds. The maximum interval length is 86,400 seconds or one set of readings per day. The minimum interval length is three seconds. An entry of zero is not allowed. Up to six intervals can be entered. ("Logarithmic intervals" do not synchronize to real-time in the manner that the "Single interval" does.)

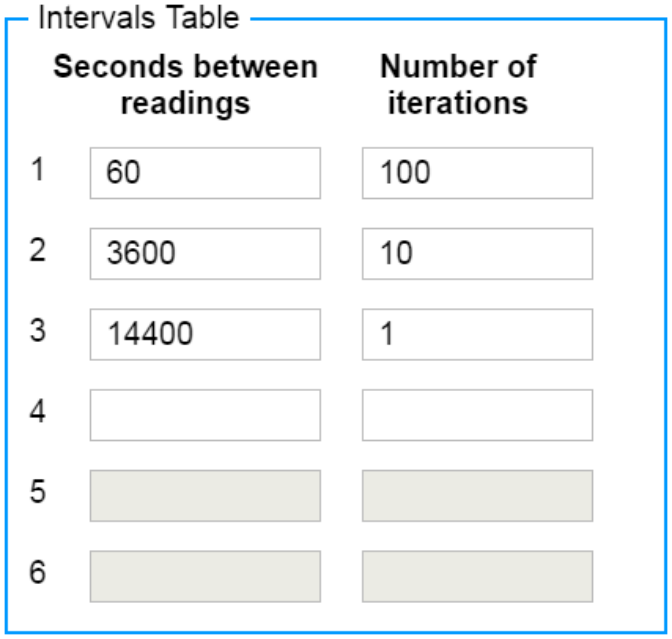

Figure 106 - Logarithmic Intervals

Number of Iterations is the number of times each interval is repeated. The maximum number of iterations is 255. Entering zero for any iteration will cause the datalogger to repeat that interval until logging is disabled. Normally an entry of zero is only used for the last interval. If the number of iterations for the last interval value is greater than zero, the datalogger will log data for the specified number of iterations and then stop logging.

5.4.3.2 Logging Schedule

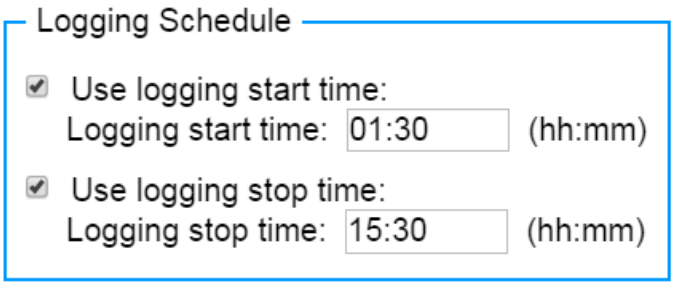

Figure 107 - Logging Schedule

The logging schedule can be used to define a specific start and/or stop time for readings to take place. This feature can be used to synchronizing the reading intervals of multiple LC2 dataloggers.

To enable the Start or Stop Time, check the corresponding box, then enter the desired time. Times must be entered in 24-hour format. For example, 3:30 PM becomes 15:30.

5.4.3.3 Memory

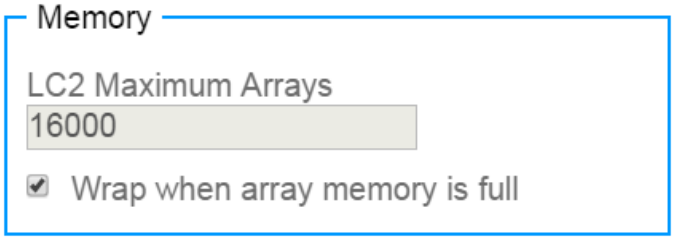

Figure 108 - Memory

The static field “LC2 Maximum Arrays” displays the maximum number of data arrays the LC2 is capable of storing. Table 30 shows the maximum arrays for each type of LC2.

LC2 Type	Maximum Number of Arrays
Single Channel	16,000
4-Channel	10,666
16-Channel	3,555

Table 30 - Maximum Data Arrays Stored

Checking the box next to “Wrap when array memory is full” will cause the LC2 overwrite the oldest data when the memory is full (i.e., the maximum number of arrays have been saved). If the box is not checked, the LC2 will halt logging when the maximum number of arrays is reached.

5.4.4 Download Schedule

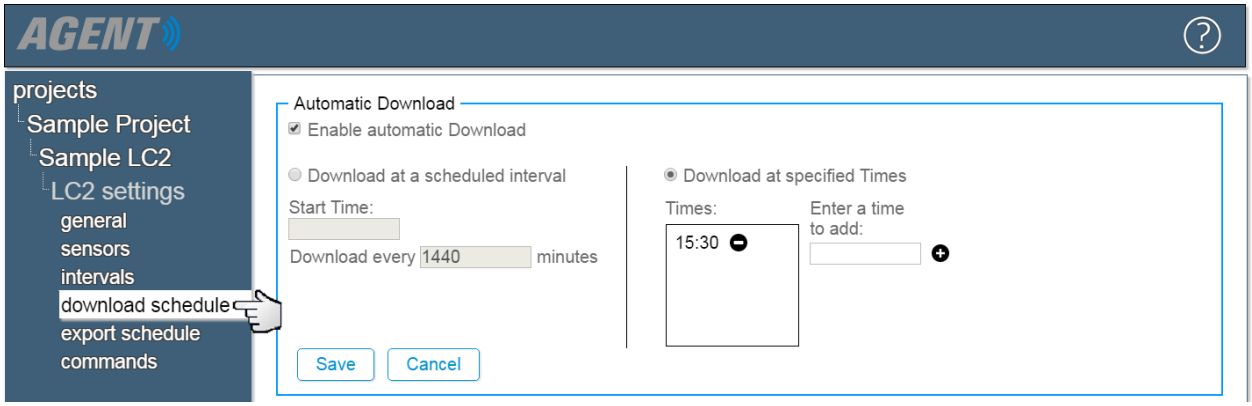

Figure 109 - Schedule Settings

Data will only be collected from the LC2 when a data download occurs. Data will not appear on charts or other screens until it has been downloaded from the LC2. Table 31 describes the available Automatic Download settings.

Label	Description
Enable Automatic Download	Check this box to have data automatically downloaded from the LC2 at regular intervals. When unchecked, data will only be downloaded when the user initiates a manual download (see Section 5.5).
Download at a scheduled interval	Select this option to have the automatic download recur in intervals. The frequency of the download will be based on the integer entered in the “Download data every __ minutes” field. The first download will occur at the specified “Start time”. (Start time must be entered in 24-hour format. For example, 3:30 PM becomes 15:30.)
Download at specified Times	Select this option to have data automatically downloaded at specific times of the day. Enter a time in 24-hour format and then click the ⊕ icon. The time entered will be added to the list of download “Times:”. To remove a download time from the list, click the corresponding ⊖ icon.
Save	Saves all fields contained within the “Automatic Download” box.
cancel	Returns the Automatic Download settings to their previously saved configuration.

Table 31 - Automatic Download Settings

5.4.5 Export Schedule

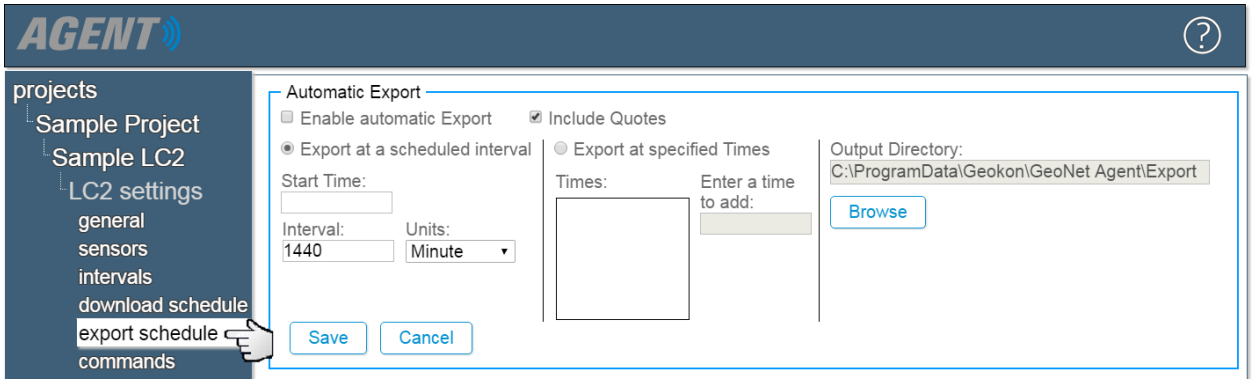

Figure 110 - Automatic Export

The Export Schedule feature of Agent is designed to work with data management programs, e.g., Vista Data Vision®. **The file type and other export settings can be changed using the "Export" screen. See Section 5.6 for more information.**

Data will be exported to the same file each time an export occurs. A new file will only be created after adding or removing an LC2, chart, or sensor, or changing the sensor mapping. In these cases, in order to maintain the historical structure of the data, the previous file will be given the extension ".bad" and a new file will be created.

Table 32 describes the available Export Schedule settings.

Label	Description
Enable Automatic Export	Check or uncheck this box to enable/disable automatic export.
Include Quotes	Contains everything between the delimiters with quotes. Regions that use alternate date formats or commas as decimal points may require this for import of the file into other programs. (Note: Checking or unchecking this box will cause the same action to occur on the "Quote the fields" check box in the "Export" screen. See Section 5.6 for information on the "Export" screen.)
Export at a scheduled interval	Select this option to have data exported at regular intervals. The first export will occur at the specified "Start time". Enter the desired start time in 24-hour format. (For example, 3:30 PM becomes 15:30.) Data download will recur based on the information entered in the "Interval" and "Units" fields.
Export at specified Times	Select this option to set specific times of the day for the data to be exported. Enter a time in 24-hour format (for example 3:30 PM becomes 15:30) in the "Enter a time to add" field and then click the ⊕ icon to add it to the list of download "Times". To remove a download time from the list, click the ⊖ icon next to the time to be removed.
Output Directory	Determines how the file will be saved. To set the Output Directory, click browse. (Note: The location chosen as the output directory will also be set as the "Export Folder" in the "Export" screen. Section 5.6 covers the "Export" screen.)
Save	Applies the current settings to the Network.
cancel	Returns the "Automatic Export" settings to their previously saved configurations.

Table 32 - Automatic Download Settings

5.4.6 Commands

The Commands Screen (Figure 111) is used to communicate with the LC2. There must be an active connection between the LC2 and the PC for the upload screen to function properly. The different sections of the screen are covered in the subsections below.

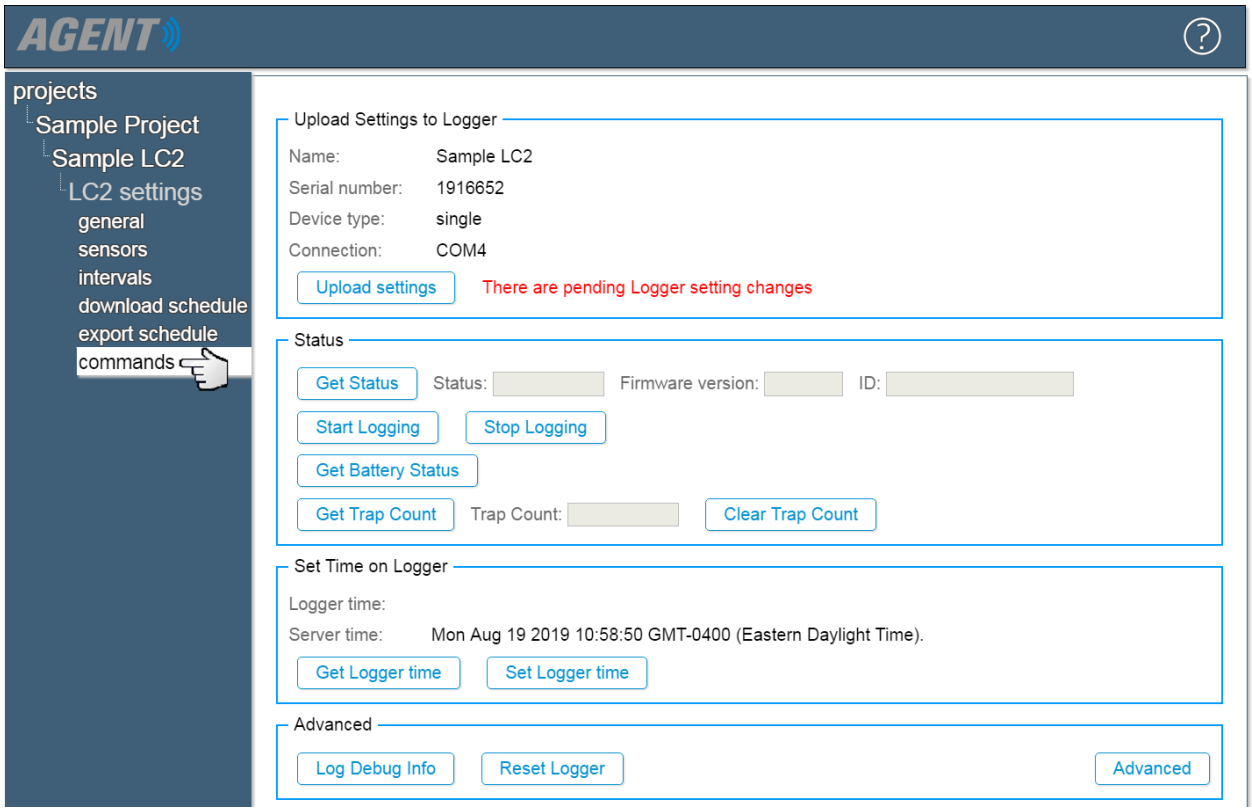

Figure 111 - Upload Settings

5.4.6.1 Upload Settings to Logger

Refer to Figure 112 and Table 33 for information on the "Upload Settings to logger" portion of the screen.

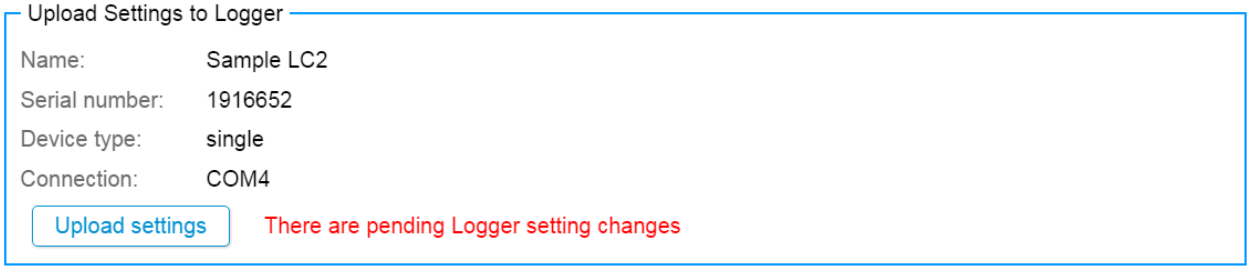

Figure 112 - Upload Settings to LC2

Label	Description
Name	Static field showing the name of the LC2. To change the name, refer to Section 5.4.1.
Serial Number	Static field showing the serial number of the LC2. To change the serial number, refer to Section 5.4.1.
Device Type	Static field displaying the type of LC2, i.e., how many channels it has.
Connection	The method of connection used for the LC2. Enter a COM port, URL, or IP address with port number. See Section 5.1.
Upload settings	The "Upload settings" button sends all settings that affect the LC2 to the datalogger.
There are pending setting changes to upload to the logger.	This message appears when changes have been saved in the "Sensors" Screen (Section 5.4.2) or "Intervals" Screen (Section 5.4.3) but have not yet been uploaded to the LC2.

Table 33 - Descriptions for Upload Settings to Logger

5.4.6.2 Status

Refer to Figure 113 and Table 34 for information on the "Status" portion of the screen.

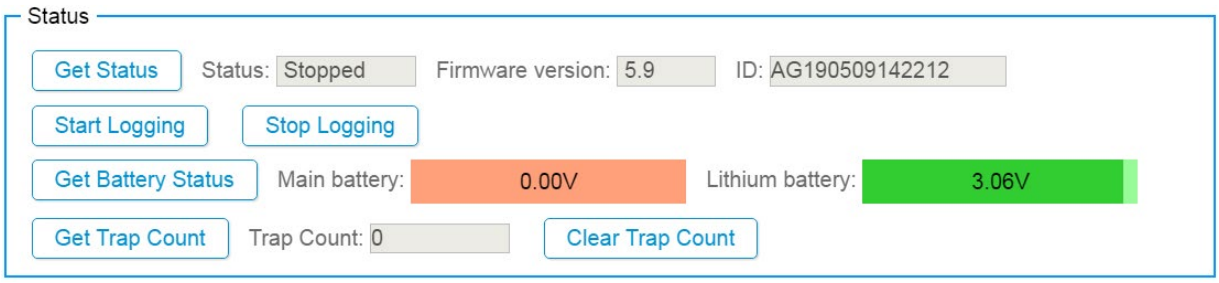

Figure 113 - Status

Label	Description
Get Status	Retrieve and display the current logging status, firmware version, and ID.
Start Logging	Click to have the LC2 begin logging data. The "Status" field will change to "Logging".
Stop Logging	Click to have the LC2 stop logging data. The "Status" field will change to "Stopped".
Get Battery Status	Click to display the current voltage level of the "Main battery" and the "Lithium battery". The Main battery (two 1.5V D cells) provides the power required to operate the LC-2 datalogger. The Lithium battery (3V lithium coin cell) maintains the correct date and time settings when the D cells are removed. Batteries should be replaced when the measured voltage drops below 1.8 VDC (internal 3V battery) or 6V (external 12V battery).
Get Trap Count	Click to display the "Trap Count". The trap counter is a register that keeps track of the number of times that the internal processor has detected a communications error. This register is used to determine if communication problems are occurring.
Clear Trap Count	Reset the trap count register to zero.

Table 34 - Descriptions for the Status Screen

5.4.6.3 Set Time on Logger

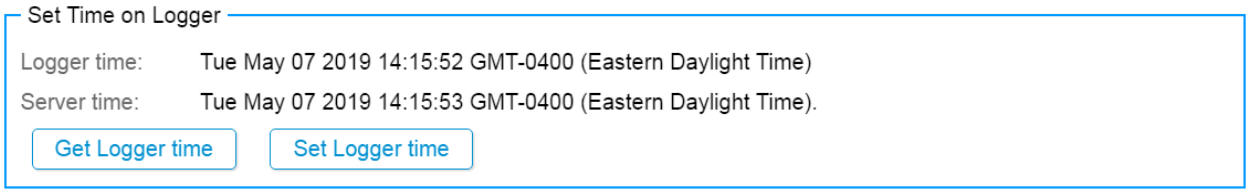

Figure 114 - Set Time on Logger

"Logger time:" shows the date and time information stored on the LC2
"Server time:" shows the date and time information collected from the PC.

Clicking Get Logger time will refresh both the "Logger time:" and the "Server time:".

Click Set Logger time to overwrite the current "Logger time:" with the date and time information from the PC.

5.4.6.4 Advanced

Figure 115 - Advanced

The advanced section of the upload screen is normally only used under the direction of GEOKON technical support and should not be needed during day-to-day operation. Contact GEOKON for more information.

5.5 Download

To open the download screen (Figure 116), select the Project that contains the desired LC2, and then click on the icon that corresponds to the LC2 to be downloaded. (The download screen can also be accessed by clicking on the name of the LC2 and then clicking download.)

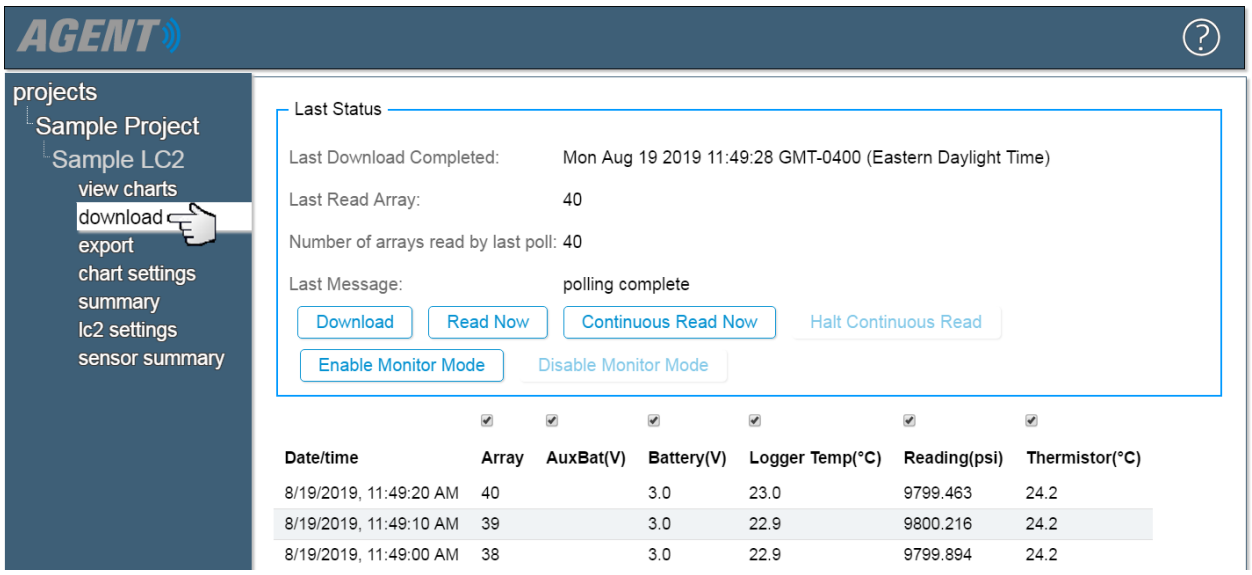

Figure 116 - Download Screen

"Last Download Completed", "Last Read Array", "Number of arrays read by last poll", and "Last Message" are static fields that display information about the previous download.

When Download is clicked, Agent will connect to the LC2 and begin downloading any new data that was collected by the datalogger since the previous download occurred. Figure 117 shows a download in progress.

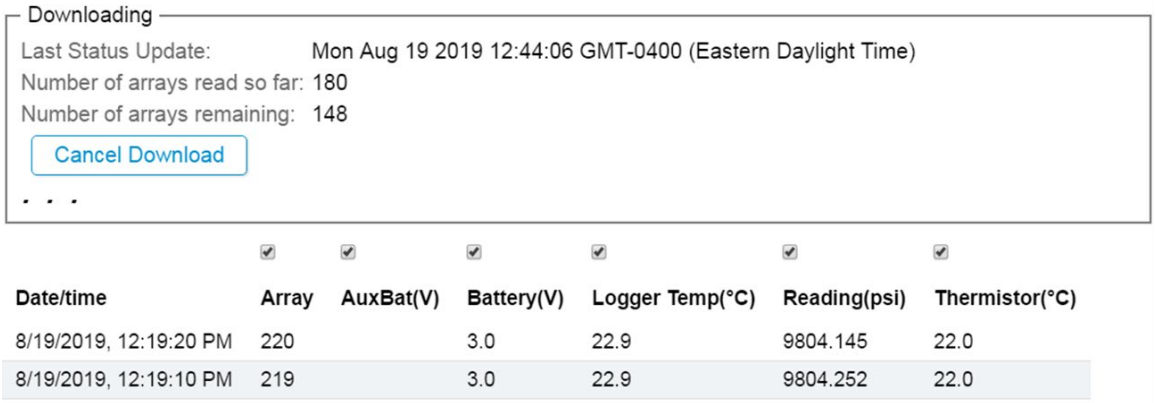

Figure 117 - Download in Progress

"Last Status Update" displays the date and time when the download began. While downloading, Agent will display the number of data arrays that have been read and the number of arrays remaining. The download can be halted by clicking Cancel Download.

Data collected from the LC2 is displayed in the table on the bottom half of the screen. The check boxes above each data column are used to show or hide the data in that column. (If no data is available for download, make sure the logging intervals are set correctly [Section 5.4.3] and that the "Start Logging" button has been pressed [Section 5.4.6].)

Click Read Now to have the LC2 to take an immediate "test" reading (Figure 118). Test readings are not saved to the LC2 or the Agent database.

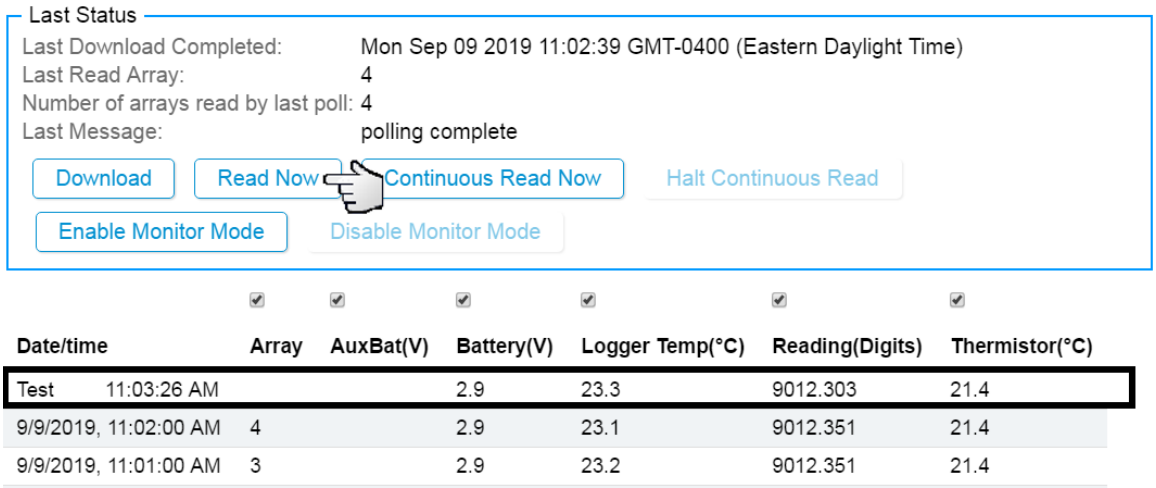

Figure 118 - Test Reading Data

Clicking Continuous Read Now will cause Agent to take a test reading every few seconds until Halt Continuous Read is clicked.

Click Enable Monitor Mode to have Agent display sensor readings taken by the LC2 as the occur (Figure 119). If no data is displayed, ensure the logging intervals are set correctly (Section 5.4.3) and the "Start Logging" button has been pressed (Section 5.4.6).

"Monitor" readings will continue to be displayed until Disable Monitor Mode is clicked.

NOTE: Readings that are displayed using "Monitoring Mode" are not saved to the Agent database until they are downloaded from the LC2 using the Download button.

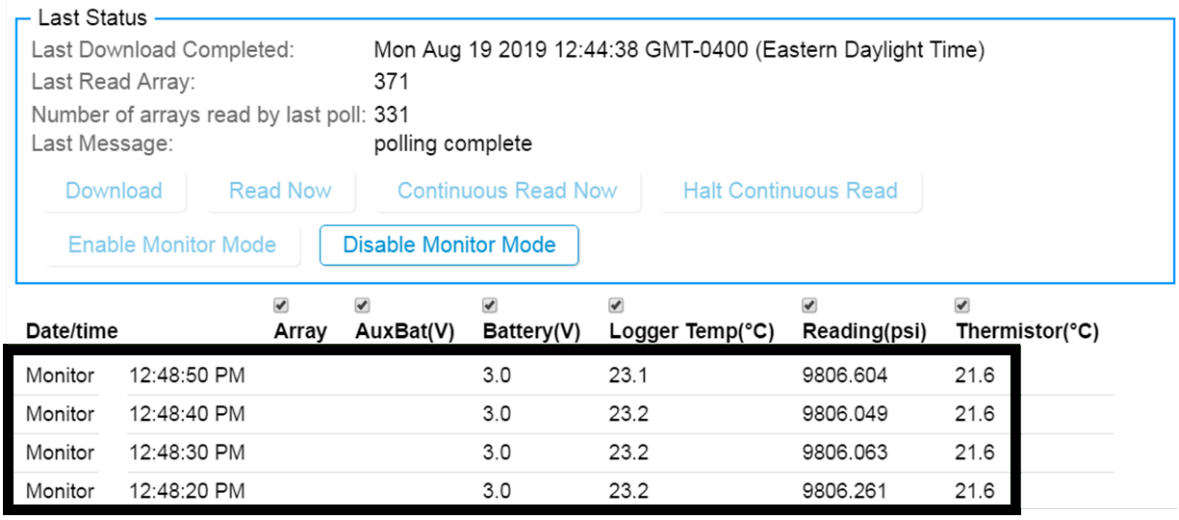

Figure 119 - Monitoring Mode Enabled

5.6 Export

The "Export" screen is used to configure the export settings and can also be used to perform a manual export of the data. The settings made in the Export screen are also applied to files automatically exported by the "Export Schedule". (See Section 5.4.5 for information on setting up an export schedule.)

Exporting data can facilitate further data processing by allowing the data to be imported into a third-party tool, such as a spreadsheet program, word processer, or data visualization software. To navigate to the Export screen, select the Project that contains the LC2 and then click on the name of the device to be exported.

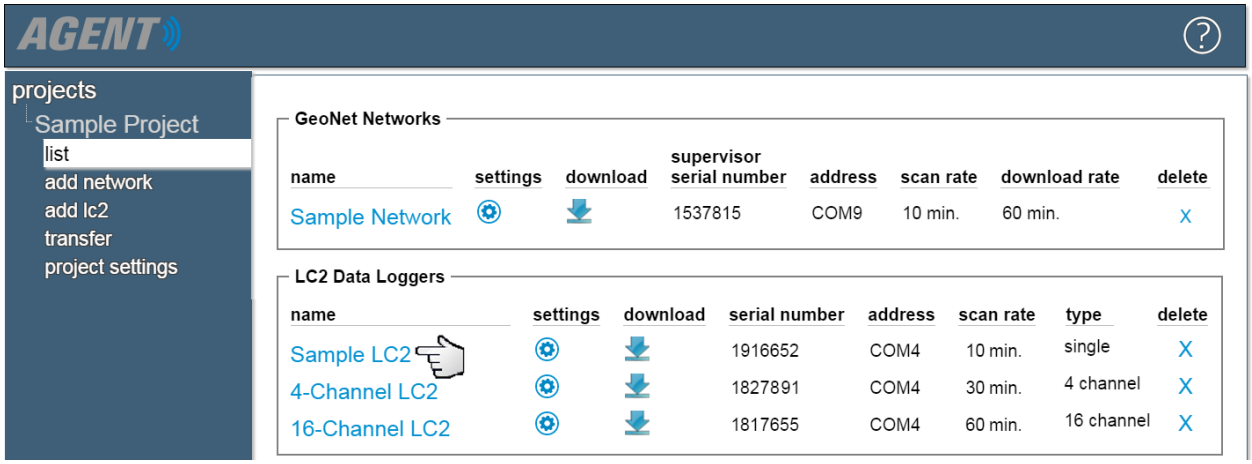

Figure 120 - Select an LC2

Agent will navigate to the "View Charts Screen". (See Section 6 for information on working with charts.) Next click export on the left side of the screen (Figure 121).

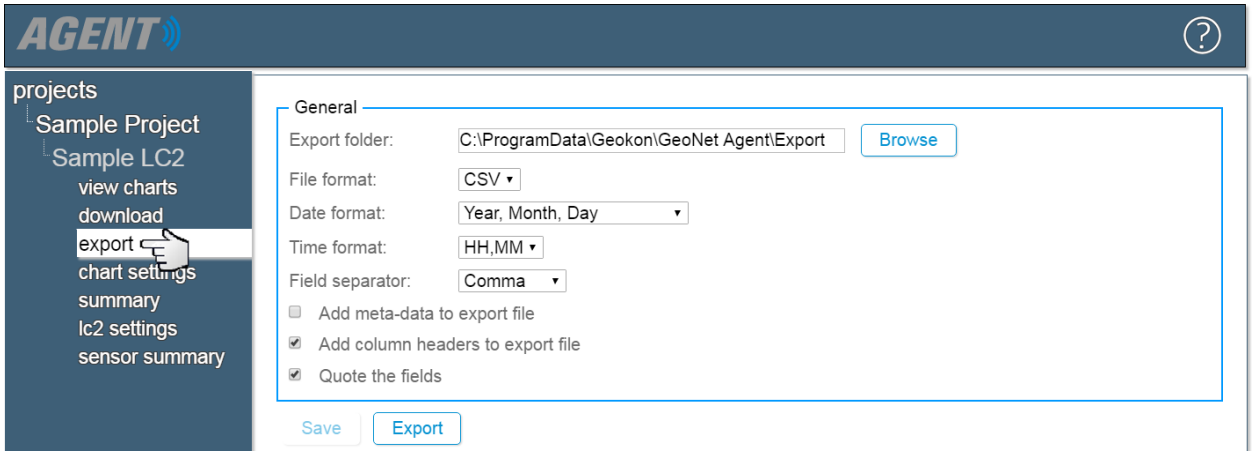

Figure 121 - Export Data

For more information about the export screen, refer to Table 35.

Label	Description
Export Folder	Determines where the data file will be saved. To set the export folder click Browse. (Note: The location chosen as the export folder will also be set as the "Output Directory" in the "Export Schedule" screen. See Section 5.4.5 for information on the "Export Schedule" screen.)
File Format	Choose **CSV, DAT, TXT** or **VDV**: **CSV** - Data files are exported in Comma Separated Value (CSV) format, which is easily imported into Microsoft Excel or other spreadsheet program. **DAT** - Data files are exported as a Generic Data File (.dat). This file type is commonly used by data visualization software. **TXT** - Data files are exported in a standard text data format (.txt), which can be opened and edited using a wide variety of text editing and word processing programs.

	VDV - Data files are exported in a format that is easily imported into Vista Data Vision software. This file is used by Vista Data Vision software to provide column names for the exported data. When "VDV" is selected for File Format, all options below "file format" are disabled except "Field Separator". The exported data is formatted and saved as a ".dat" file in the export folder.
Date Format	Determines how the date stamp on the data arrays will be displayed in the exported file. Choose from: "Year, Month, Day", "Year, Day of year" or "Serial date". When Serial date format is chosen, all date and time columns, except the year (yyyy), are replaced with a decimal number representing the number of days since 1/1/1900. The number will contain a fractional (time) part, which represents a percentage of 24 hours. For instance, the number, 40532.75393518519, represents the date: 12/20/2010 and the time: 18:05.
Time Format	Choose whether to have a comma inserted between the hour and minute on the time stamp of the data arrays.
Field Separator	Determines how fields are separated within the data file. Choices include: Comma (,) Semicolon (;) and Tab (ASCII 09)
Add Meta-Data to Export File	Select this option to add Agent meta data is to the top of the export file. This data consists of: workspace name, Project name, scan interval, collection date, and number of sensors.
Add Column Headers to Export File	Select this option to add a header to the top of each column that describes what data the column contains, e.g., logger name, array, sensor name, etc.
Quote the fields	When this option is selected, each field is wrapped with double quotes. This may be necessary if any of the fields contain the selected separator character. (Note: Checking or unchecking this box will cause the same action to occur on the "Include Quotes" check box in the "Export Schedule" screen. See Section 5.4.5 for information on the "Export Schedule" screen.)
Save	Saves the current settings. If the export settings have been changed, they must be saved before the file can be exported.
Export	Exports the data to the chosen folder. If the Export button is not active, save the export settings, then try again.

Table 35 - Descriptions for the Export Screen

6. CHARTS

Charts display data imported by sensors as a graph. Sensors must be added to a chart before it will display any data.

If automatic download is enabled, new data will be added to charts automatically each time data is downloaded from the Network. If automatic download is disabled, charts will not update until a manual download is performed

6.1 Creating Charts

Navigate to the GeoNet Node, Supervisor, or LC2 datalogger the chart will be created for and then click chart settings (Figure 122).

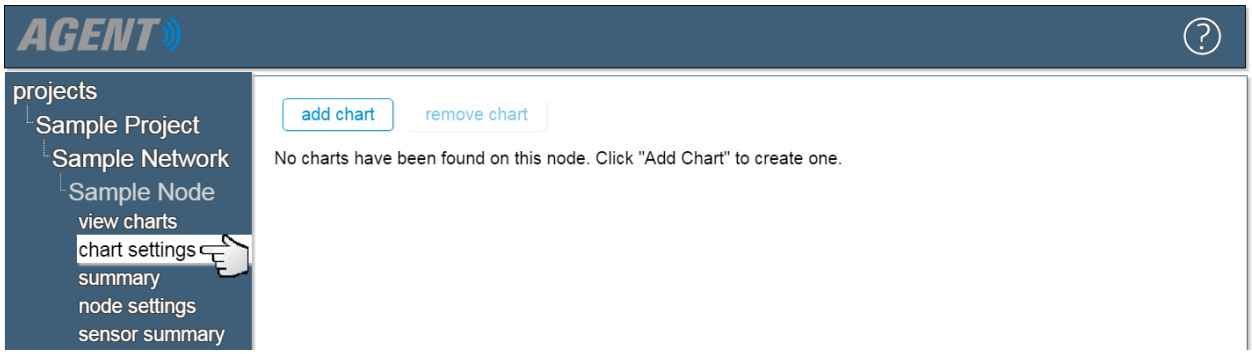

Figure 122 - Chart Settings

To create a new chart, click add chart. This will open the Edit Chart dialog box (Figure 123).

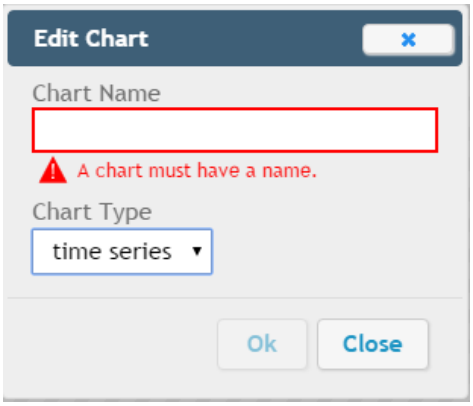

Figure 123 - Edit Chart Dialog

The only available "Chart Type" will be "time series" except when creating a chart for a device that has been set to the device type of 8800-XX-ADR (tilt) or "Addressable MEMS" *and* has a "String of MEMS Deflection Sensors" added to it. When creating a chart for these devices, an additional chart type of "Deflection" available. (See Section 6.3.2 for more information on MEMS deflection charts.)

Click Ok to create the chart. Once a chart has been created, it will be listed on the chart settings screen (Figure 124).

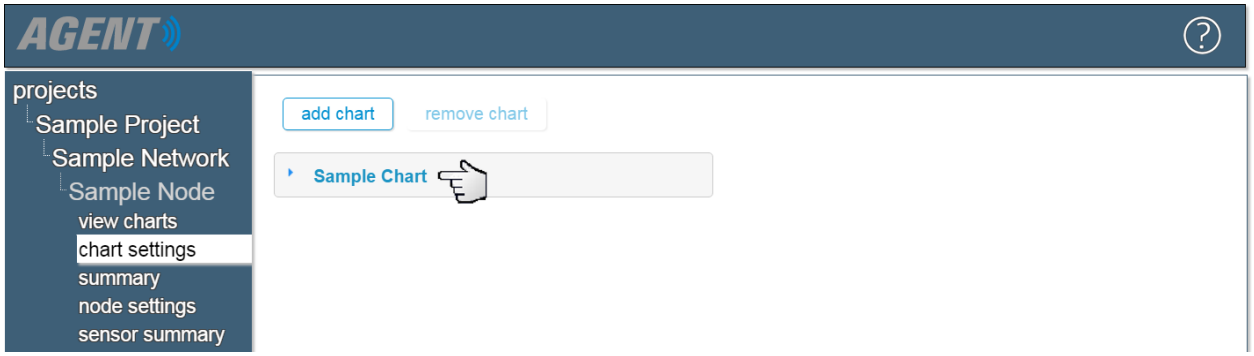

Figure 124 - List of Charts

The chart name and type can be changed at any time by clicking on the chart name and then clicking then clicking edit (Figure 125).

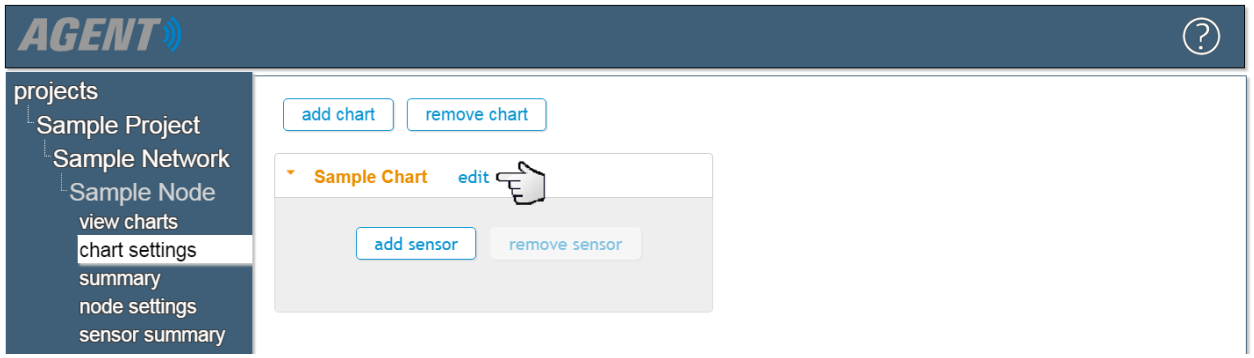

Figure 125 - Edit Chart

To remove a chart, click on the name of the chart to be deleted and then click remove chart.

6.2 Adding Sensors to Charts

A chart displays data collected by sensors; therefore, a chart will not display any data until at least one sensor has been added to it. To add a sensor to a chart, select the desired chart from the list and then click add sensor (Figure 126).

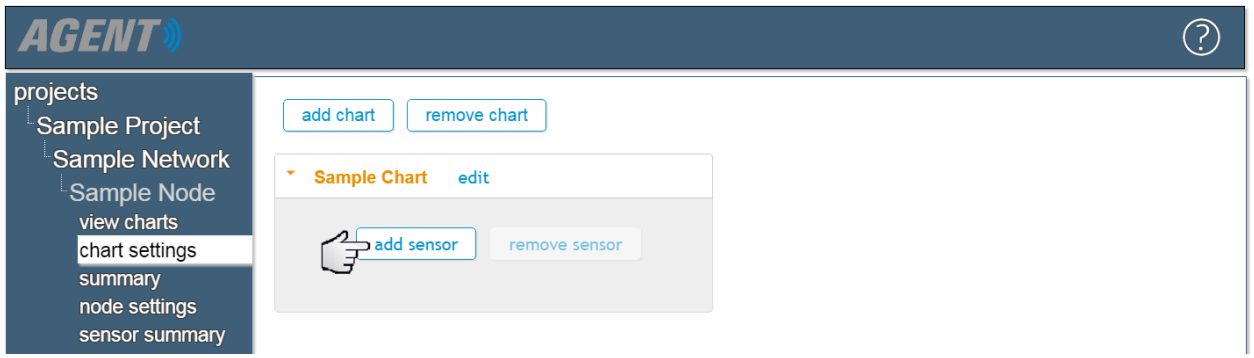

Figure 126 - Add Sensor

This will open the “Add Multiple Sensors to Chart” dialog (Figure 127).

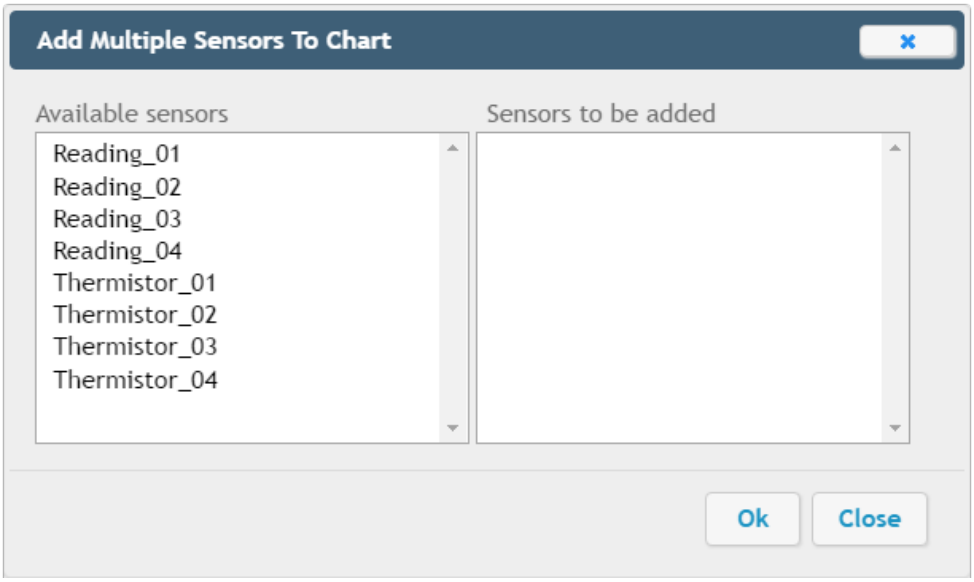

Figure 127 - Add Sensors to Chart

Click on the desired sensors in the list of "Available Sensors" to add them to the list of "Sensors to be added". (For LC2 dataloggers, all the logger's sensors will be available. For GeoNet devices, only sensors that were previously added to the device will be available. For information on adding sensors to GeoNet devices, see Section 4.7.)

Click Ok to add all the sensors in the "Sensors to be added" list to the chart.

Sensors that have been added to the chart will be listed beneath the chart name (Figure 128).

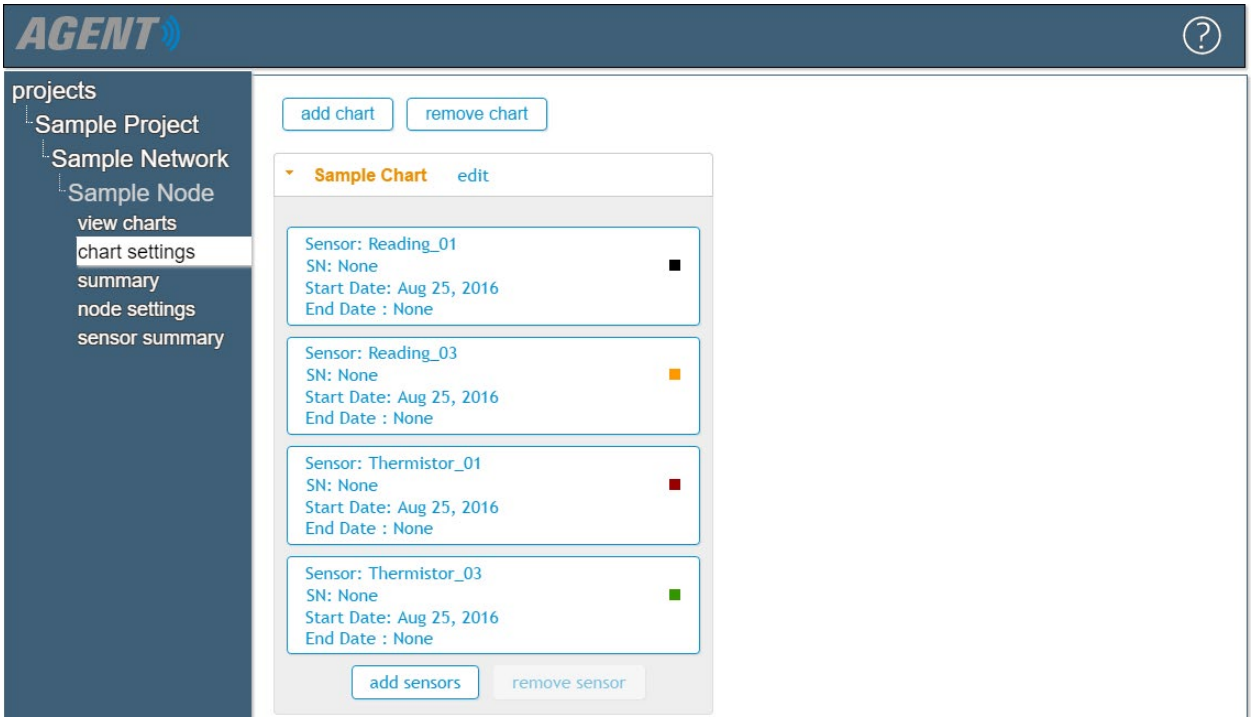

Figure 128 - Sensors Associated with a Chart

To remove a sensor from a chart, click on the sensor to be deleted and then click remove sensor.

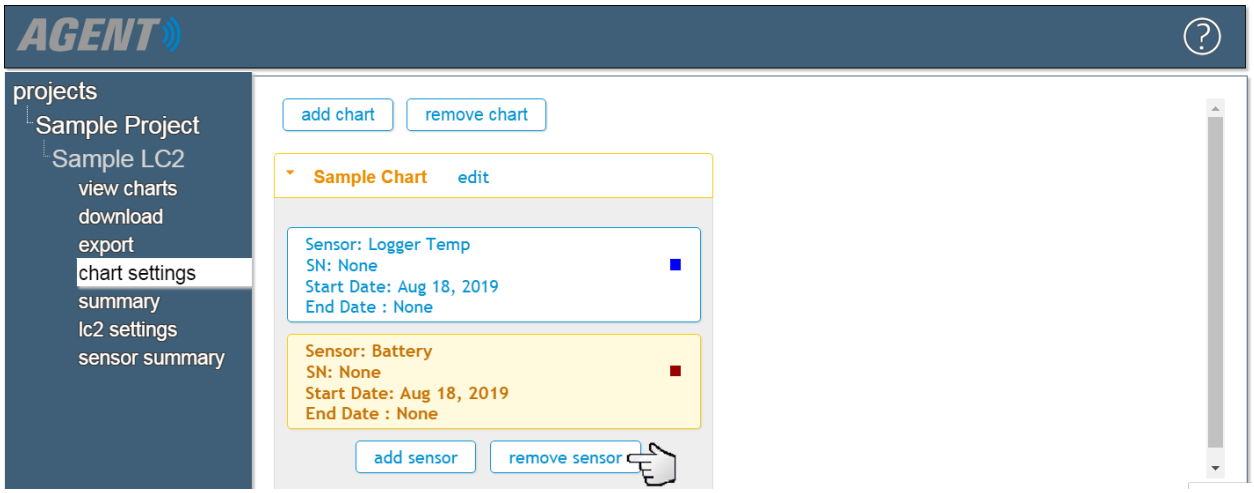

Figure 129 - Remove Sensor from Chart

6.3 Viewing Charts

To view the charts associated with a device, navigate to the desired GeoNet Node, Supervisor, or LC2 datalogger and then click view charts. The charts displayed in the view charts screen will update only when new data is downloaded from a device.

6.3.1 Time Series Charts

Charts are displayed as a line graph, with time comprising the X-axis and senor data comprising the Y-axis. Refer to Figure 130 and Table 36 for more information.

Figure 130 - View Chart Screen

Arrow #	Description
1	Unchecking the box next to “Show tooltips on charts” will disable the popup details shown by arrow two.
2	The date, time, and reading of any data point can be viewed by hovering the cursor over it.
3	Click ☰ icon to save the chart as one of the following file types: PNG, JPEG, PDF, or SVG.
4	Click on the sensor name of a sensor to show or hide the corresponding graph. In (Figure 130) the graph line for the “Battery” sensor has been hidden.
5	These sliders can be used to zoom in on a particular area of the graph.
6	Displays the start/stop time of the data being graphed. (Can be changed by moving the sliders highlighted by arrow seven.)
7	These sliders determine the range of data displayed. If there is no data to display at the specified start date, the chart will start with the nearest previous data set.

Table 36 - Descriptions for the View Charts Screen

When there are multiple charts associated with a single device, the charts are displayed in the order they listed on the Chart Settings Screen. To change the order, click chart settings on the left side of the screen, then click and drag the charts into the desired order (Figure 131).

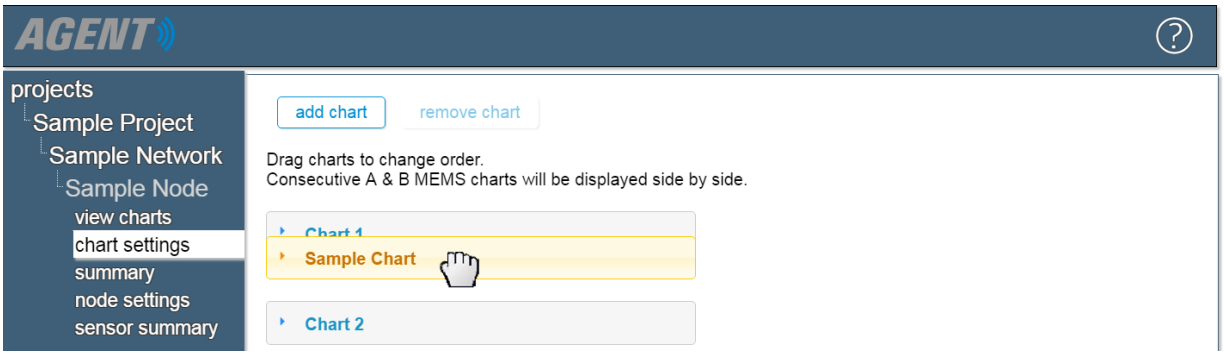

Figure 131 - Reorder Chart List

6.3.2 MEMS Deflection Charts

To add a MEMS deflection chart to a Node, the Node's "Type" must be set to 8800-XX-ADR (tilt) or "Addressable MEMS" and a "String of MEMS deflection sensors" must have been added to the Node (see Section 4.7.5).

To create a deflection chart, navigate to the Node the chart will be created for and then click chart settings (Figure 132).

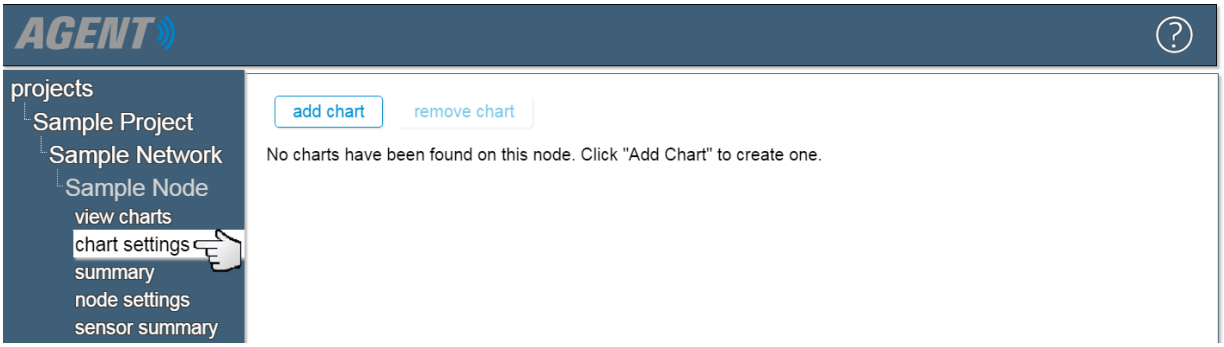

Figure 132 - Chart Settings

Next, click add chart. This will open the Edit Chart dialog box. Select "MEMS Deflection" as the chart type. Then select whether the chart will display the A or B axis of the MEMS sensors (Figure 133).

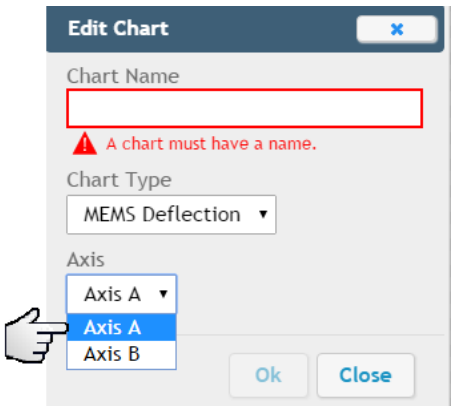

Figure 133 - Select Axis A or Axis B

Enter the required information and then click Ok to create the chart. Clicking Close will return the program to the previous screen without saving.

Once a chart has been created, it will be listed on the chart settings screen. To view the created chart, click view charts on the left side of the screen (Figure 134).

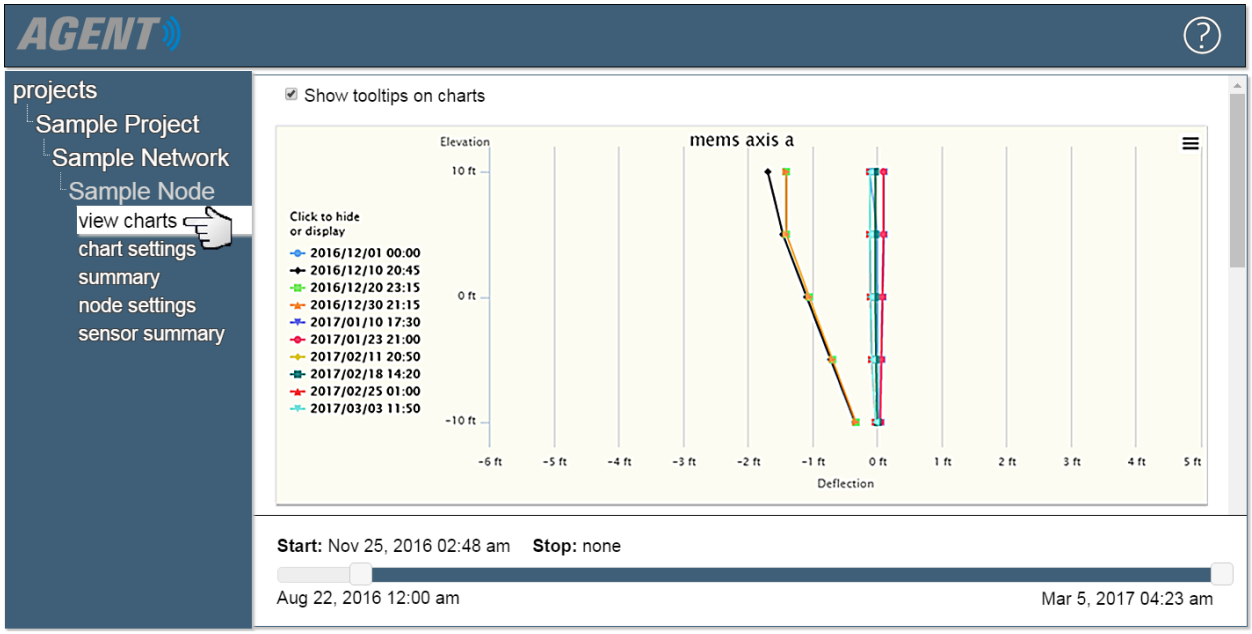

Figure 134 - MEMS Deflection Chart

MEMS deflection charts are static charts. They display a series of snapshots taken over the lifetime of the MEMS string. Each vertical line on the chart represents the cumulative deflection of all the sensors on a MEMS string at a particular point in time. Since the line represents a cumulative deflection, it requires that values be present for all drops. If the number of drops specified for the MEMS string is greater than the actual number of drops in the string, no lines will be displayed. The vertical axis of the line represents the elevation, and the horizontal axis is the deflection.

The legend on the left-hand side of the graph shows the date and time the readings were taken for the corresponding line. (This can also be seen by holding the pointer over a data point.) Clicking on the date and time of a reading in the legend will hide/display the graph line for that reading.

The sliders at the bottom of the chart determine the range of data displayed. If there is no data to display at the specified start date, the chart will start with the nearest previous data set.

6.4 Live Charts

Live charts are only available for GeoNet devices. The Live Charts Screen works similarly to the View Charts screen; the main difference being that Live Charts shows the previous six hours of data for all the charts associated with a Network. Live Charts will update at regular intervals according to the automatic download time assigned in Network Settings. If automatic download is disabled, the charts will be static. (For more information on Network Settings, see Section 4.4.)

To open the Live Charts Screen for a GeoNet Network, select the Project that contains the Network and then click live on the left side of the screen (Figure 135).

Figure 135 - Live Charts

The Live Charts Screen has the same controls as the View Charts Screen, with the exception that there are no start and stop sliders for the date since only the previous six hours of data is displayed.

6.5 Chart Summary

The Chart Summary Screen controls which charts will be displayed on the View Charts and Live Charts screens. It is also used to create templates which allow the user to copy chart settings from one device to another. (Chart settings can only be copied between devices of the same "Type", e.g., 8800-XX-01C Node to 8800-XX-01C Node, 4-channel LC2 to 4-channel LC2, etc.)

To view the chart summary for a device, navigate to the desired Node, Supervisor, or LC2 and then click summary on the left side of the screen (Figure 136).

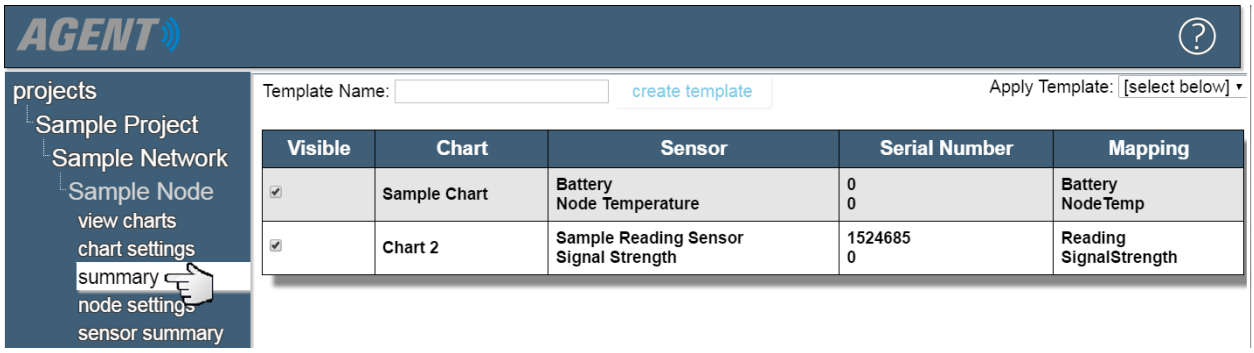

Figure 136 - Chart Summary

Table 37 describes the available settings.

Label	Description
Template Name	Enter a descriptive name for the template.
create template	Create a template to copy chart settings from one device to another. (Device type must match.)
Apply Template	Apply a template created from another device to the one currently selected. Only templates created for matching device types will be available.
Column Heading	**Description**
Visible	Check or uncheck the boxes in this column to show or hide the corresponding chart in the View Charts and Live Charts screens.
Chart	Displays the chart name.
Sensor	Displays the names of sensors that have been added to the chart.
Serial Number	Displays the serial number of the sensors.
Mapping	Displays the sensor type.

Table 37 - Descriptions for the Chart Summary Screen

7. ALERTS

Alerts are notifications that appear on the View Charts and Live Charts screens when sensor data exceeds the limits set by the user.

7.1 Adding Alerts

7.1.1 GeoNet Devices

To add an alert to a sensor on a GeoNet device:

Navigate to the Node or Supervisor the alert will be created for, click node settings on the left side of the screen, and then click on the "Alerts" column that corresponds with the desired sensor (Figure 137).

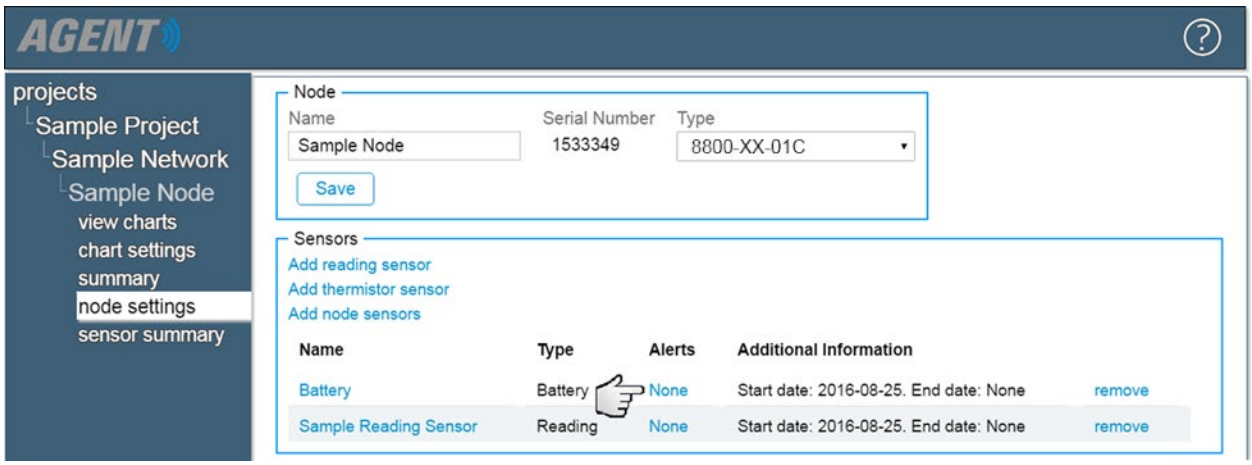

Figure 137 - Adding an Alert (GeoNet)

For all sensor types except "String of MEMS" and "2 Axis Tilt Meter" sensors, clicking on a link in the "Alert" column will cause the "Edit Alerts" dialog described in Section 7.2 to open.

Because MEMS sensors can have separate alerts set for the A-Axis, B-Axis, and Thermistor of each drop, they require the extra step of selecting which axis or thermistor the alert will be set for (Figure 138). Once an Axis or Thermistor has been selected the "Edit Alerts" dialog described in Section 7.2 will open.

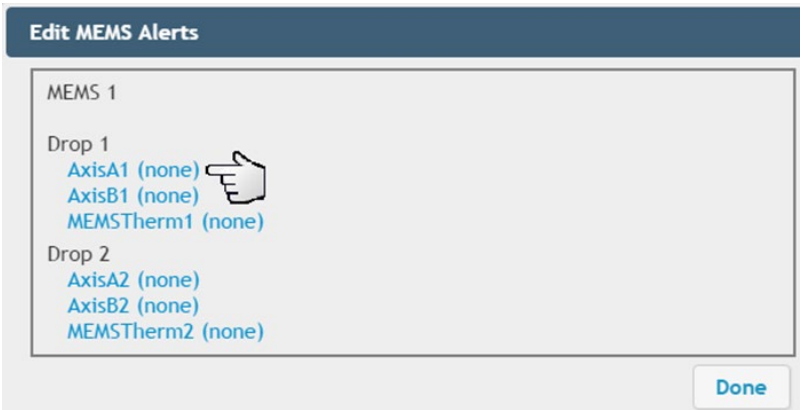

Figure 138 - MEMS Sensor Alerts

7.1.2 LC2 Dataloggers

To add an alert to a sensor on an LC2 datalogger:

Select the Project that contains the LC2, and then click the icon that corresponds with LC2 the alert will be created for (Figure 139).

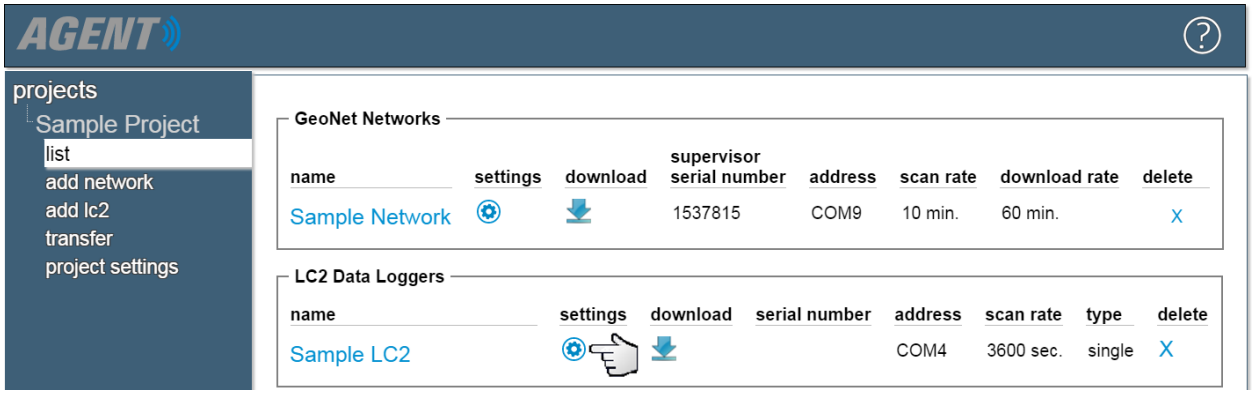

Figure 139 - Select an LC2 Datalogger

Agent will navigate to the "General" LC2 Settings. Next click sensors on the left side of the screen to open the sensor settings. Lastly, click on the "Alerts" column that corresponds with the desired sensor (Figure 140).

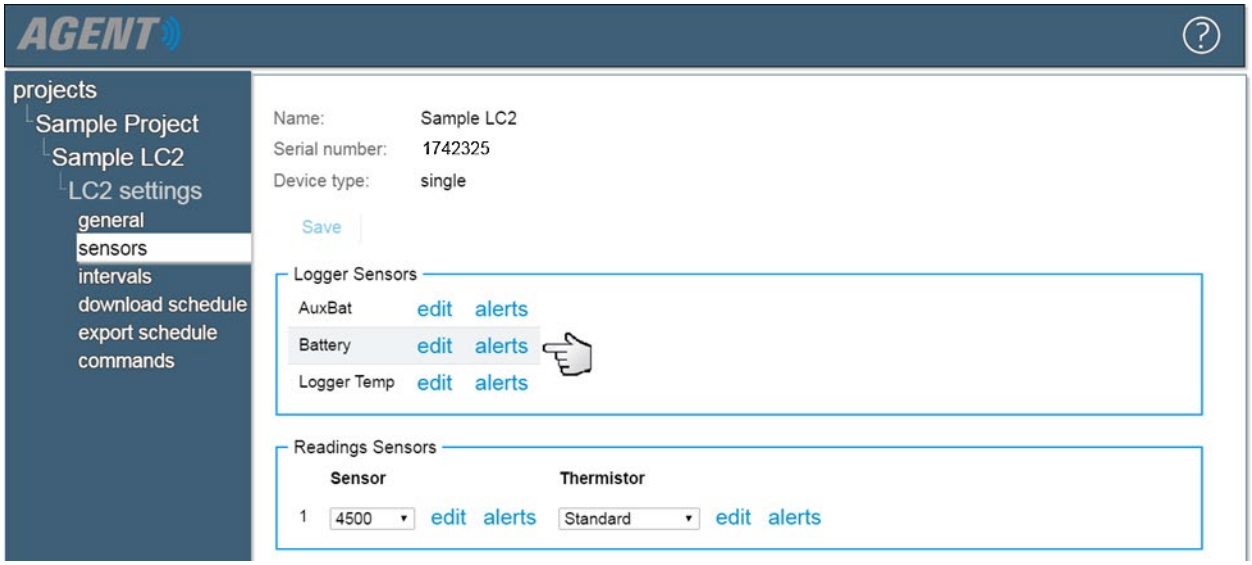

Figure 140 - Adding and Alert (LC2)

This "Edit Alerts" dialog described in Section 7.2 will open.

7.2 Edit Alerts Dialog

The Edit Alerts Dialog (Figure 141) is used to add, edit, or delete alerts for the selected sensor. Each blue box represents an available alert.

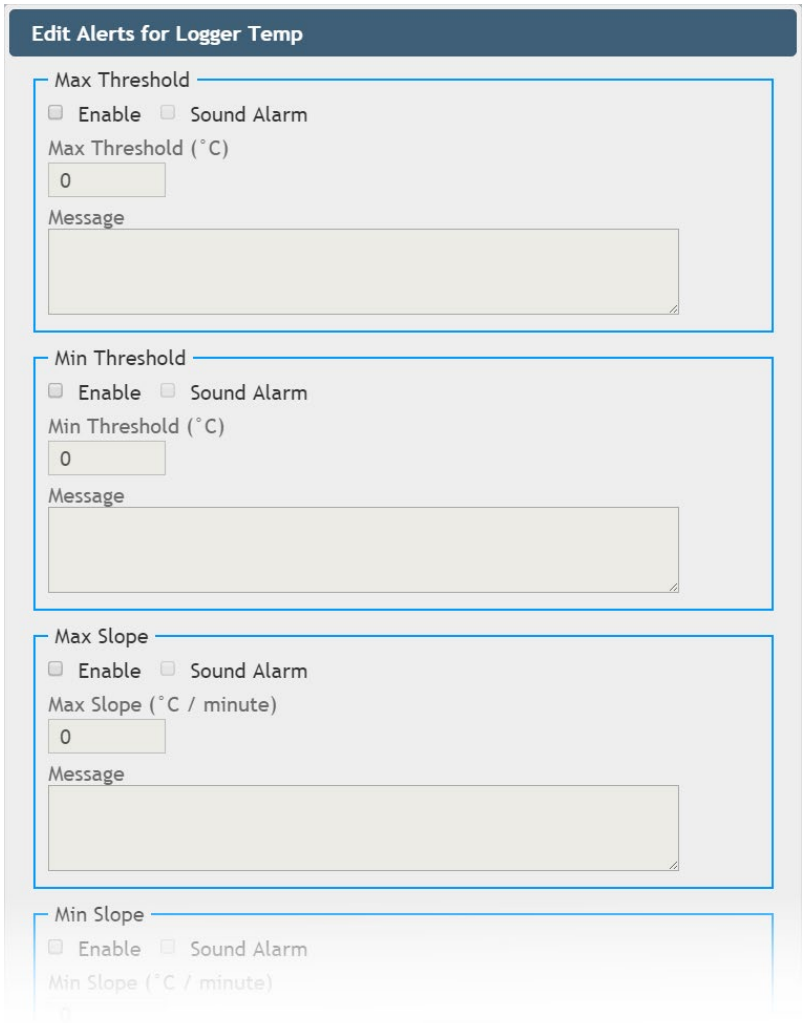

Figure 141 - Edit Alerts Dialog

Refer to Figure 142 and Table 38 for more information on the Edit Alerts dialog.

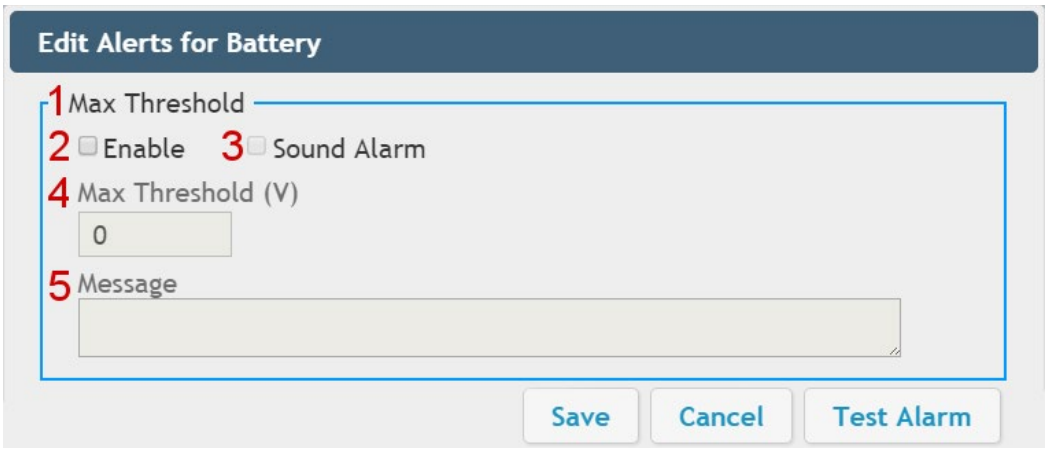

Figure 142 - Edit Alerts Dialog

Corresponding # in Figure 142	**Description**
1	The alert type is shown at the top of each blue box. Alert types are as follows: **Max Threshold:** Activates when data rises above the set value. **Min Threshold:** Activates when data falls below the set value. **Max Slope:** Sets a maximum threshold on the amount the sensor value can change over the period of one minute. **Min Slope:** Sets a minimum threshold on the amount the sensor value can change over the period of one minute. **Old Data:** Activates when the time between readings exceeds the set value.
2	Check the "Enable" box to turn on the alert. Once an alert's "Enable" box has been checked, the information that coincides with that alert can be edited.
3	Check the "Sound Alarm" box to turn on an audible alarm for the alert. The alarm will only sound when a new alert is generated while viewing Live Charts. The alarm sound can be changed by following the instructions in Section 7.5.
4	An alert will become active once the data has exceeded the value entered as the "Max Threshold" or "Min Threshold".
5	The text entered in the "Message" field will be displayed in the Alert details. The alert details can be viewed by holding the cursor over the alert triangle (as shown in Figure 145 in Section 7.3).
Save	Saves the current settings.
cancel	Closes the dialog and returns the alert settings to their previously saved configuration.
Test Alarm	Press to hear an example of the audible alarm. To change the alarm sound, follow the instructions in Section 7.5.

Table 38 - Alert Settings

7.3 Example Alert

Figure 143 is an example of an alert created for a node temperature sensor which has been set to activate if the reading rises above 25 degrees Celsius. Figure 144 shows the alerts that were subsequently generated in the View Charts Screen.

Figure 143 - Alert Example

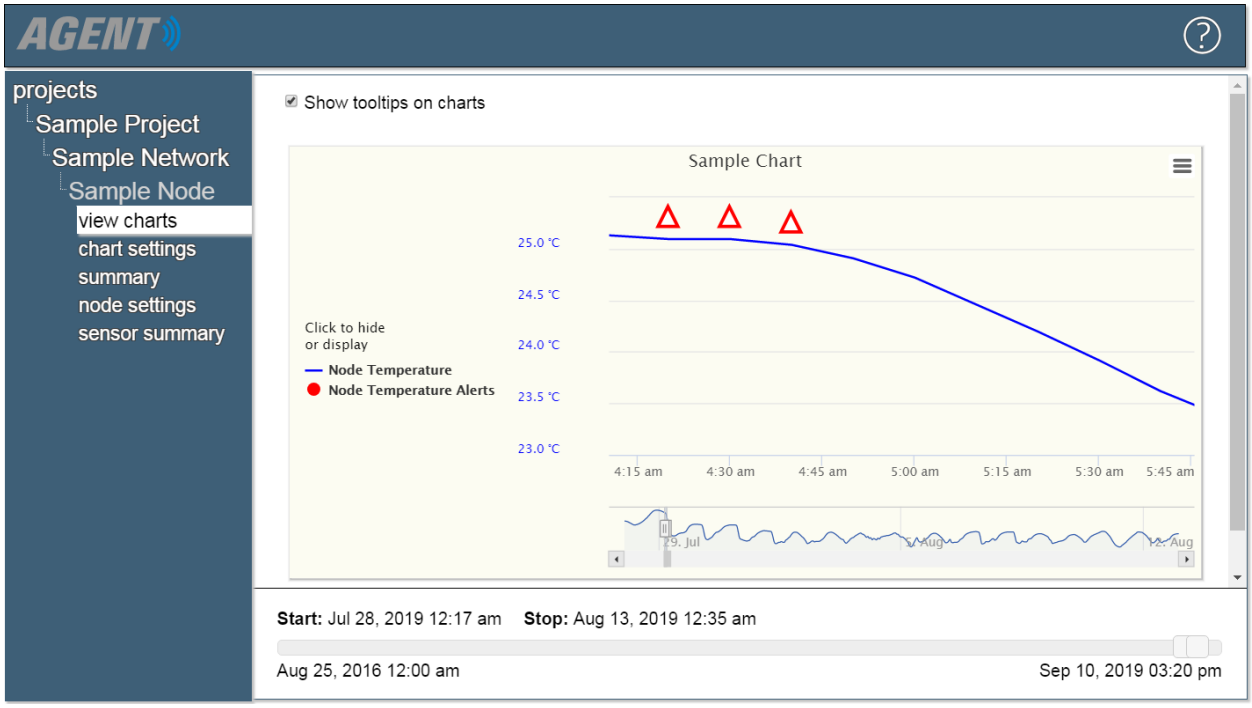

Figure 144 - Active Alerts

Details about an alert can be seen by hovering the mouse over the alert triangle (Figure 145).

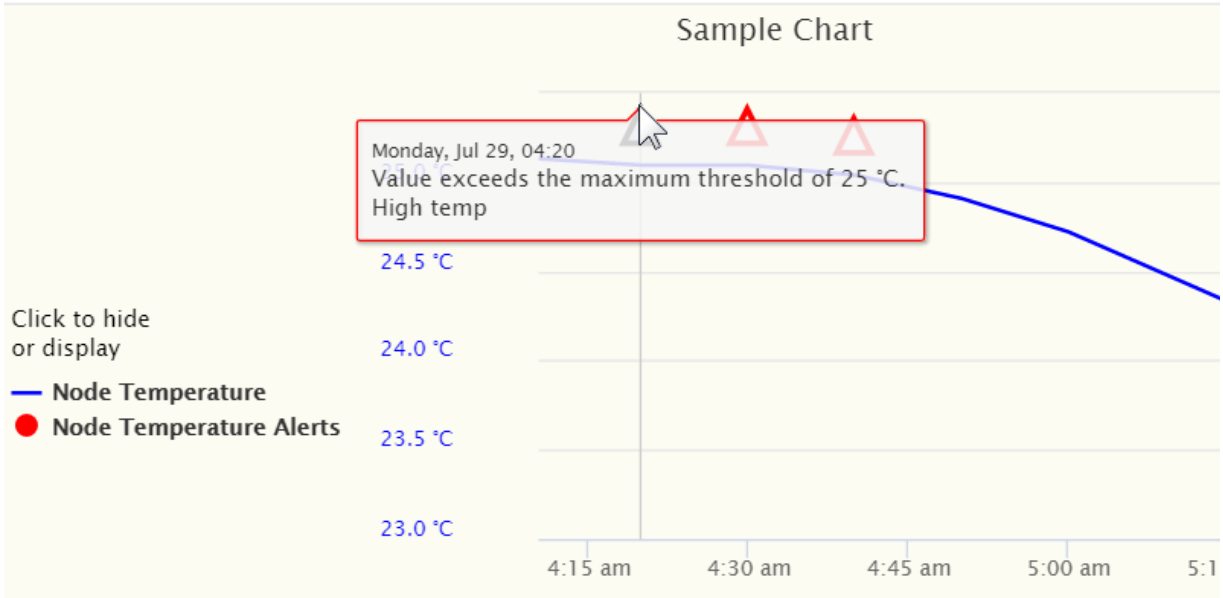

Figure 145 - Alert Detail

7.4 Clearing Alerts in Live Charts

To clear all the alerts for a particular chart while in the Live Charts Screen, click the icon located on the bottom left corner of the affected chart (Figure 146). Clearing all current alerts will cause the red alert bar on the left side of the screen to disappear. Exiting Live Charts will cause previously cleared alerts to reactivate.

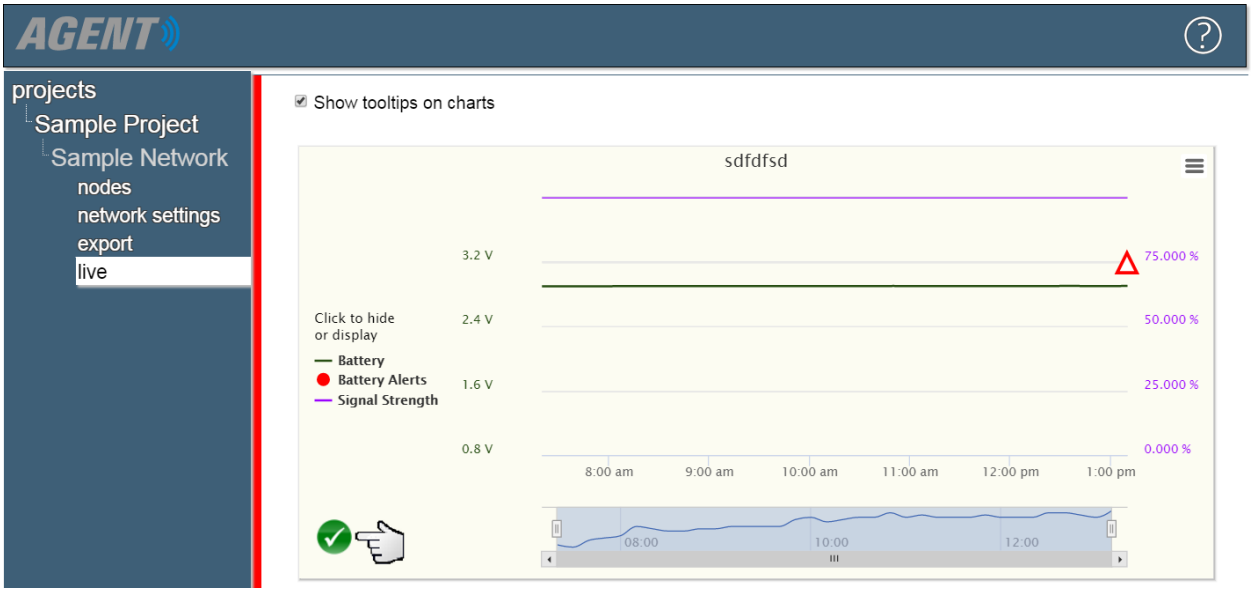

Figure 146 - Clearing Alerts in Live Charts

7.5 Changing Alarm Sound

Agent provides a default alarm sound. To change the alarm sound, complete the following:

1) Locate the "GeoNetAlarm.wav" file that was saved to the computer when Agent was downloaded. This file can be found on the drive the program was downloaded to in the following folder: ProgramData\GEOKON\GeoNet Agent\Alarms

2) Overwrite the current GeoNetAlarm.wav file with a .wav file of the new alert sound. (The file name must still be ***GeoNetAlarm.wav*** for the alarm to work properly.)

3) After the file has been installed, return to the Edit Alerts screen in Agent (Section 7.2) and click on Test Alarm to verify the new alarm sound is working correctly. (If the alarm file cannot be found, e.g., it has been deleted or misnamed, the default alarm sound will be played instead.

8 TRANSFERRING DATA

Transferring data allows the user to save and subsequently load all of the data for a GeoNet Network or LC2 datalogger. Data transfer can facilitate moving data from one computer to another or from one Project to another.

To transfer data, navigate to the Projects Screen by clicking projects on the left side of the screen. Next, select the Project the data will be transferred from or to, and then click transfer (Figure 147).

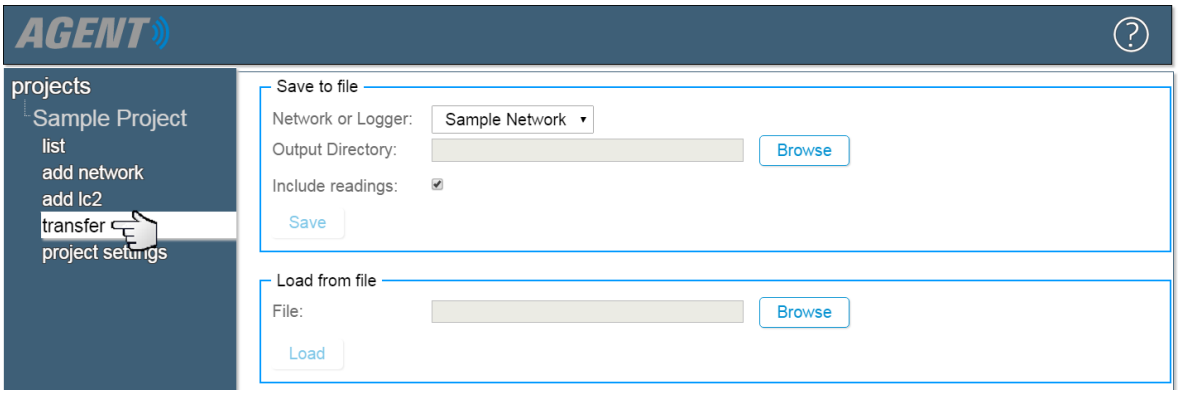

Figure 147 - Transferring a Network

8.1 Save to File

To save a data file, choose a GeoNet Network or LC2 datalogger to from the drop-down list next to "Network or Logger:".

Next, set the output directory (i.e., where the file will be saved) by clicking Browse. Navigate to the desired save location then click Select Folder. Once a location has been selected, it will appear in the "Output Directory" field. (**NOTE:** Transferred files must be saved to local drives only. Agent does not support uploading files from Network drives.)

The "Include readings" box determines whether sensor readings will be included in the file. Unchecking the box will omit all sensor readings from the saved file. (This can be used to reduce the file size.)

Click Save to save the data to the selected location.

The name of the file is automatically generated, and includes the Network/datalogger name, as well as the date and time the file was created. The process of saving the Network may take several minutes, depending on the amount of data being saved.

8.2 Load from File

To load data from a previously saved file click Browse, select the file to be imported, and then click Load. Confirm the transfer by clicking Ok in the dialog box that follows. The loading process may take several minutes, depending on the amount of data contained in the file. **NOTE**: After loading a GeoNet Network file, the Network address must be entered (see Section 4.4).

9. TROUBLESHOOTING

Listed below are a few commonly experienced problems and remedial action. Additional troubleshooting information can be found at https://www.geokon.com/Videos. Contact the factory should a problem arise not explained herein, or if additional information is needed.

Symptom: Unit will not respond to communication

- ✓ Wrong connection type or port specified in Agent.
- ✓ The internal batteries of the Supervisor may be dead. Replace the batteries.

Symptom: No data for vibrating wire gauge

- ✓ Check for a faulty or misconnected gauge.
- ✓ Take a test reading by pressing the status button on the Supervisor. The reading will be available for download within the next 6 minutes, depending on radio cycles and Supervisor type.
- ✓ Using an ohmmeter, check the connections to the vibrating wire gauge leads. Consult the gauge manual for expected resistance between the gauge leads. Remember to correct for cable resistance, approximately 14.7Ω per 1000 feet (48.5Ω per km) of 22 AWG wire. Multiply this factor by two to account for both directions. If the resistance is very high or infinite, the cable is probably broken or cut. If the resistance is very low, the gauge conductors may be shorted.

Symptom: Vibrating wire gauge reading is unstable

- ✓ Is there a source of electrical noise nearby? Likely candidates are generators, motors, arc welding equipment, high voltage lines, etc. If possible, move the transducer cable away from power lines or electrical equipment.

Symptom: Thermistor measurement shows -273.15 degrees Celsius

- ✓ Indicates an open circuit to the thermistor leads. Check the connections from the datalogger to thermistor leads. If okay, check the thermistor with an ohmmeter. It should read between 10K ohms and 2.4K ohms (0° to +30° Celsius). If the thermistor reads correctly, contact the factory to schedule the unit for repair.

Symptom: Thermistor measurement is approximately double the actual ambient temp.

- ✓ The thermistor value must be entered into the “Description/Notes” field of the thermistor sensor. See Section 4.7.2 for details.

Symptom: Node has weak communication

- ✓ If the signal indicated is consistently weak (red and green lights) but not intermittently red, proceed with the installation. If the signal is frequently lost (red flash) it will be necessary to improve it. Try to get the Node as high as possible with clear space around the antenna. Adding cable to the sensor will enable moving the Node to a better location. A higher gain directional antenna may be necessary. Contact GEOKON for help.

Symptom: Node will not synchronize with Network

- ✓ If the Node status light upon power up flashes red at one-second intervals for more than three minutes, the Node is not receiving a signal from the Supervisor. Make sure the Node is set to the same radio channel as the rest of the Network. Consult the GeoNet System Manual for information about setting the channel. Reset the Node by holding down the status button for 10+ seconds until both lights turn on. Older Node versions require the batteries to be removed and replaced for a reset.

Symptom: Not retrieving data when clicking manual download  ***button***

- ✓ Verify that the Network address is correct.

- ✓ If using a Cellular Network Connection, it may be necessary to recommission the Supervisor and/or commission the Node that is not providing data.

- ✓ If connected to a COM port, verify that the cable is securely plugged into your computer and the Supervisor.

- ✓ If using an exterior (add on) Network connection, verify that you can connect to the address by bringing up CMD prompt in windows. Then type "ping *address*", replacing *address* with the address of the Network, then hit enter. If it returns responses the connection should be stable.

Symptom: When in the settings the "Current Network Time" says "Cannot Connect"

- ✓ Follow the same troubleshooting steps as for the previous symptom.

Symptom: Clicking "get Network settings" button results in "The operation has timed out" or "Access is denied" message

- ✓ Follow the same troubleshooting steps as for the previous symptom.

Symptom: Missing Data

- ✓ When using a Cellular Gateway Supervisor, only data that has been uploaded to the Network Server (cloud) is available for download. Data is sent from the Supervisor to the Network Server in recurring intervals when a certain amount of time has passed, or a set number of readings is reached. Contact Geokon for more information.

- ✓ Missing data may occur when the automatic download schedule is set in such a way that the download occurs at the same time sensor readings are being taken. This can also occur if the automatic export schedule is identical to the automatic download schedule. As a general rule there should be a minimum of a 10-minute offset between the automatic download occurring and a sensor reading or automatic export occurring (15-minutes for large networks). For example:
  12:00 = Sensor Reading taken
  12:10 = Download
  12:15 = Export

Symptom: Cannot navigate in the user interface

- ✓ This is a known issue in the client user interface. Press the “ALT” key on the computer.

APPENDIX A. DETERMINING THE CORRECT COM PORT

A.1 RS-232 Connections

In most instances, RS-232 connections will use COM1, but may utilize COM2 or COM3 if the PC has more than one internal serial port.

A.2 USB Connections

1) Unplug the USB cable from the computer.

2) On the PC, click /Start, then type “device” in the start search box.

3) Click on “Device Manager” in the control panel list.

4) Click the triangle to the left of “Ports (COM & LPT)” to expand the list (Figure 148).

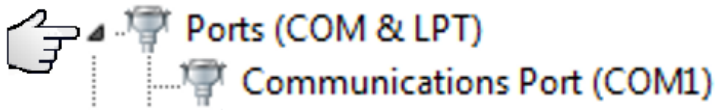

Figure 148 - COM Port List

5) Plug the cable/adapter into the USB port.

6) A new port will appear on the list. The COM port will be shown in parentheses (see Figure 149).

Figure 149 - USB Port Example

APPENDIX B. CALIBRATION DATA API

GEOKON maintains a Calibration Data web API that can be used to programmatically retrieve calibration data for select instruments. It enables automated population of coefficients necessary to convert instrument data to engineering units in GEOKON's Agent and third-party software. In the past, calibration coefficients were provided in hard copy and required manual entry that is both time consuming and prone to error.

The root of the Calibration Data API URL is "http://cal.GEOKON.com/apiv1" with the remainder of the path consisting of an abbreviation for the type of sensor and the serial number of the instrument as a parameter. Table 39 shows the current instrument types and date ranges that exist in the database.

Type	Models	Path	Start Date
Piezometer	4500S, 4500SH, 4500AL(V)	/piezo/	January 3, 2017
Rebar Strainmeters	4911, 4911A	/sticks/	January 3, 2017
Load Cells	4900, 4915	/loadcell/	April 4, 2018
MEMS IPI	6150E	/mems/	November 28, 2017

Table 39 - Current Calibration Data Available

Below are example URLs for each type, with a real serial number for testing:
http://cal.GEOKON.com/apiv1/piezo/?sn=1733358
http://cal.GEOKON.com/apiv1/mems/?sn=1742630
http://cal.GEOKON.com/apiv1/sticks/?sn=1639027
http://cal.GEOKON.com/apiv1/loadcell/?sn=1725895

Trying to navigate to these addresses with a browser will usually display the data in xml format which is human readable and is a good test of a properly formed URL. Figure 150 shows a typical response in Chrome.

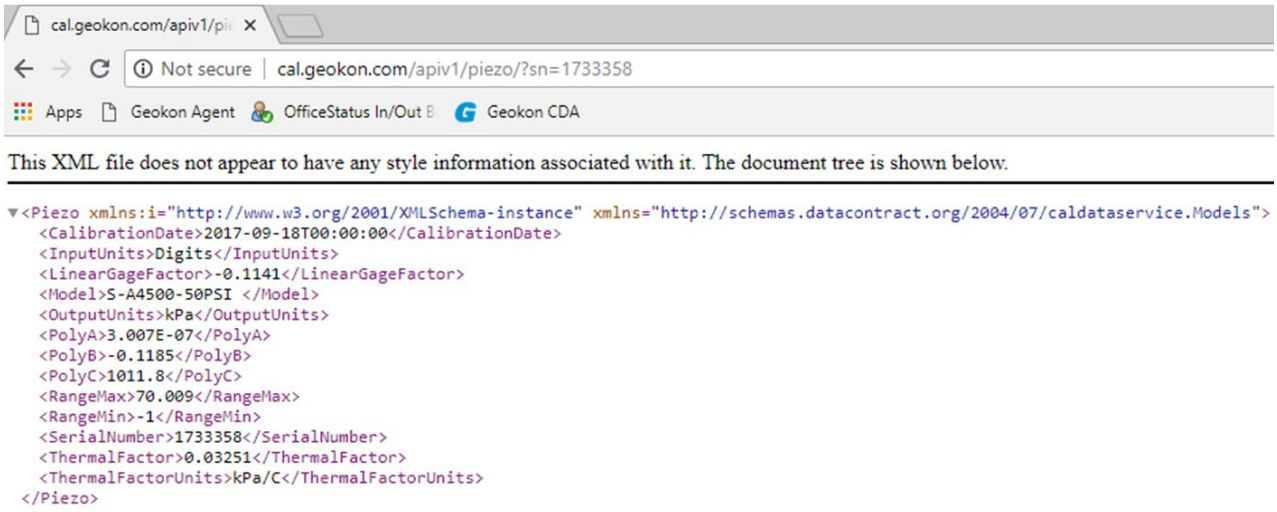

Figure 150 - Typical XML Format Response

The following C# code example illustrates how to obtain serialized calibration data with the option of json or xml format:

```
        private string GetCalibrationData(string url, int serialNumber, bool json)
        {
            try
            {
                url = url + $"//?sn={serialNumber}"; // build the URL from the base and
serial number as a parameter

                HttpWebRequest webRequest = WebRequest.Create(url) as HttpWebRequest;

                if (webRequest == null) return null; // abort if unable to create the
request object

                webRequest.ContentType = $"application/{(json ? "json" : "xml")};
charset=utf-8"; // select the type of response, json or xml

                webRequest.Method = "GET";

                WebResponse response = webRequest.GetResponse();

                using (Stream responseStream = response.GetResponseStream())
                {
                    if (responseStream == null) return "the server replied but the
response stream is null";
                    StreamReader reader = new StreamReader(responseStream,
Encoding.UTF8);
                    return reader.ReadToEnd();
                }
            }
            catch (Exception ex)
            {
                return ex.Message;
            }
        }
```

The response can then be de-serialized into the appropriate object. A number of tools exist to generate the classes from the json, as shown in Figure 151.

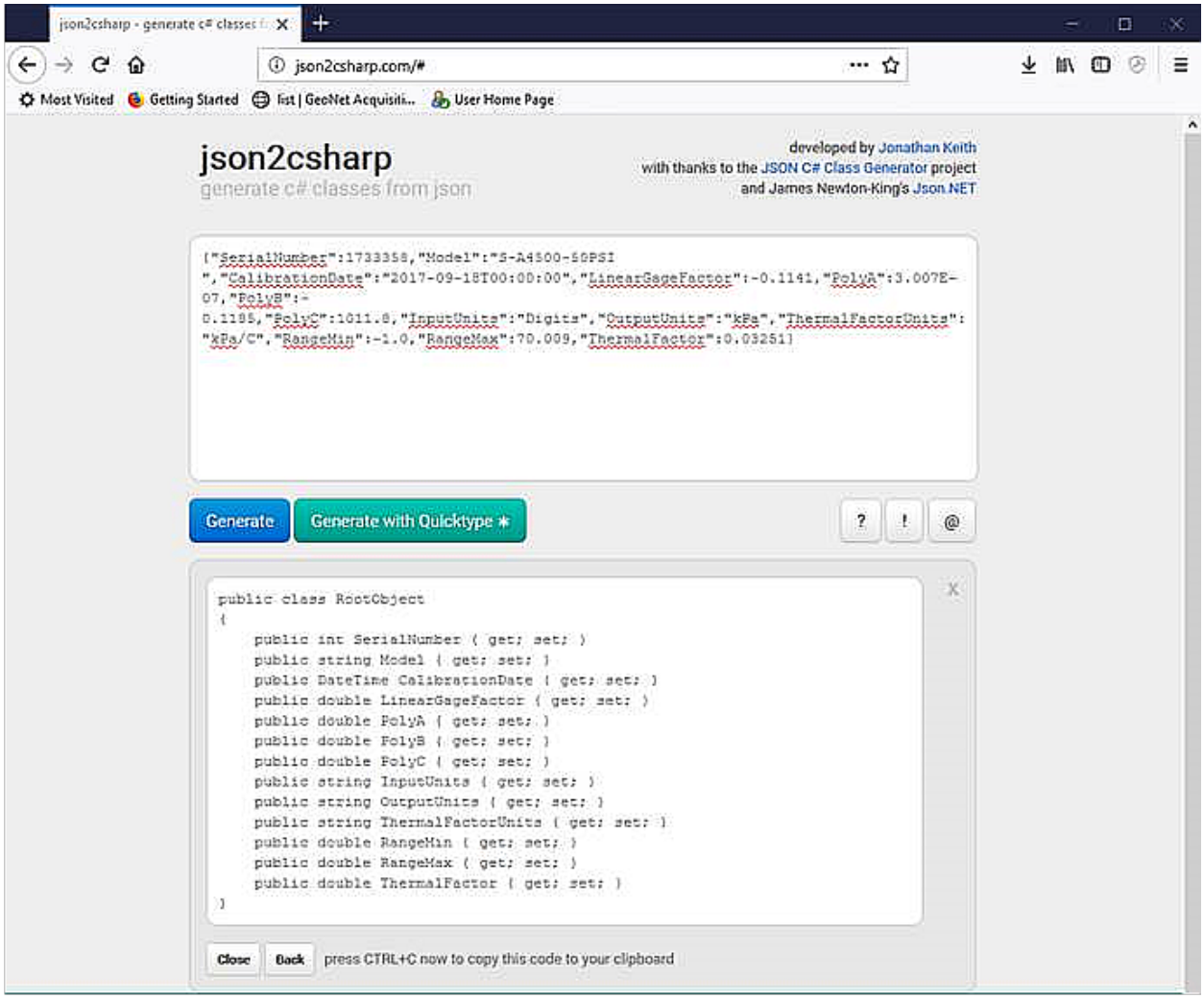

Figure 151 - Json2csharp Example

APPENDIX C. CEFSHARP LICENSE